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Abstract

This article investigates how Information Systems researchers apply institutional theoretical frameworks. We include theoretical, methodological and empirical aspects to explore modalities of use. After an overview of institutional concepts, we carry out a thematic analysis of journal papers on IS and institutional theory indexed in EBSCO and ABI databases from 1999 to 2009. This consists of descriptive, thematic coding and cluster analysis of this textual database. On the basis of thematic coding and cluster analysis, our findings suggest three groups of publications which represent different methodological approaches and empirical foci: descriptive exploratory approaches, generalizing approaches, and sociological approaches. We suggest that these three groups represent possible patterns of the use of meta social theories in IS research, reflecting a search for disciplinary legitimacy. This helps us analyze papers according to how they use and apply theories. We identify the organizing vision and the regulatory approach as two institutionalist intermediary concepts developed by IS researchers. Furthermore, we find that institutional theoretical frameworks have been used in direct, intermediary or combined conceptualizations. As a conclusion, we make suggestions to blend different conceptualizations, methodologies and empirical foci to enrich the use of institutionalist theories in IS empirical research. A comparison with the use of, for instance, structuration theory in IS research would also further insights into how researchers apply meta theories and may help develop IS theorization further.

Keywords: Theory Application; Institutionalism; Information Systems

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APPLYING INSTITUTIONAL THEORETICAL FRAMEWORKS IN MIS RESEARCH

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Abstract

This article investigates how Information Systems researchers apply social theories to their field, using the example of institutional theoretical frameworks. We include theoretical, methodological and empirical aspects to explore modalities of use. After an overview of institutional concepts, we carry out a thematic analysis of journal papers on IS and institutional theory indexed in EBSCO and ABI databases from 1999 to 2009. This consists of descriptive, thematic coding and cluster analysis of this textual database. On the basis of thematic coding and cluster analysis, our findings suggest three groups of publications which represent different methodological approaches and empirical foci: 'descriptive exploratory approaches', 'generalizing approaches', and 'sociological approaches'. We suggest that these three groups represent possible patterns of the use of 'meta' social theories in IS research, reflecting a search for disciplinary legitimacy. This helps us analyze papers according to how they use and apply theories. We identify the "organizing vision" and the regulatory approach as two institutionalist 'intermediary' concepts developed by IS researchers. Furthermore, we find that institutional theoretical frameworks have been used in 'direct', 'intermediary' or 'combined' conceptualizations. As a conclusion, we make suggestions to blend different conceptualizations, methodologies and empirical foci to enrich the use of institutionalist theories in IS empirical research. A comparison with the use of, for instance, structuration theory in IS research would also further insights into how researchers apply meta theories and may help develop IS theorization further.

Keywords: THEORY APPLICATION; INSTITUTIONALISM; INFORMATION SYSTEMS

1. Introduction : Using meta-theories

Over the last two decades, an increasing number of IS researchers have drawn on 'grand' social theories to make sense of IS or ICT-related social dynamics (Flynn and Gregory, 2000; Jones, 1999, 2003; Klecun, 2004; Monod, 2004; Jones and Karsten 2008). Giddens' structuration theory (e.g. Desanctis and Poole, 1994 or Orlikowski, 1992, 2000), Foucault's vision of power (e.g. Avgerou and McGrath, 2007), Bourdieu's theory of practice (e.g. Levina and Vaast, 2005) or Callon and Latour's Actor Network theory (e.g. Walsham and Sahay, 1999 or Scott and Wagner, 2003) have attracted an increasing audience. Indeed, as stated by Jones (2000: 123) for the IFIP Working Group 8.2 (Organizational and Societal Issues of Information Systems) "an appreciation that the social context of the development and use of information technologies is essential to an understanding of information systems". Nonetheless, many seminal writings from social theories imported by IS scholars, do not deal explicitly with their potential use, i.e. the way they can be 'applied' to organizational settings through specific research techniques and 'intermediary' concepts/theories. Some of them (like structuration theory) are simply referred to as 'meta-theoretical' perspectives, that is to say "a perspective within which to locate, interpret and illuminate other approaches" (Walsham and Han, 1991: 79).

In contrast, most organizational scientists and IS researchers have followed a very different path because their research has empirical ambitions. The question of 'applying' theories is therefore not at all anecdotal for PhD students or researchers (Gregor, 2006).. In our experience, we find that even if they do understand social theories, they have difficulty selecting and instrumenting a particular part of a theory to advance their fieldwork and develop a theoretical contribution.

In this paper, our aim is to investigate the mechanisms by which IS researchers have applied institutional and neo-institutional theoretical frameworks. These have been used fairly recently and quite extensively in IS research. Most seminal institutional writings (by Commons, Veblen, DiMaggio, Powell, Scott…) are extremely theoretical with rare empirical examples. As a result, the general question we will address is: How do IS researchers use institutional theoretical frameworks to carry out their empirical work? We describe and analyse existing patterns in the case of institutional research and suggest further potential possibilities.

Institutional research about IT addresses a broad range of information technologies and focuses on the usual topics of interest found in the IT literature: innovation, adoption, implementation and assimilation (Mignerat and Rivard, 2005, 2009). This research generally falls under one of three broad themes (Mignerat and Rivard 2009): the impact of institutional pressure on the diffusion of IT innovations, the institutionalization process of software applications and the interaction between the IT artefact and existing institutions.

To our knowledge, two substantial reviews of IS research based on institutional theory have been previously conducted (Mignerat and Rivard, 2009; Weerakkody et al., 2009). These reviews identify the growing interest for institutional theory in the IS field, the organizational level as the main unit of analysis, and quantitative research as

the main research methodology mobilized. These two reviews do not focus on papers where institutional theoretical frameworks are combined with other theoretical frameworks. Nor do they highlight how researchers applied the theories, which is the specific focus of our paper.

The first part of the paper introduces general institutionalist and neo-institutionalist theoretical frameworks. Its purpose is to provide sufficient detail to support the understanding and identification of uses of institutionalist theory in the IS research literature. Next we explain our research method based on thematic and factorial analyses of all the articles (for the period 1999-2009) indexed by ABI and EBSCO which have carried out some form of institutional analysis of IS. We then present our findings and analyse our results, showing that three forms are evident in the use of institutional theories. We discuss how IS researchers have applied institutional theories and developed intermediary conceptualizations specific to IS phenomena and why certain types of theory use seem more common than others. We attempt to identify patterns, discuss possible institutional reasons for their existence and legitimacy, and we suggest further avenues of exploration in future IS research.

2. Main institutional and neo-institutional theoretical frameworks: an overview

As institutional theory is characterized by epistemological pluralism and conceptual ambiguity (Currie and Swanson 2009; Currie 2009), it is vital to understand key notions such as "institution", or more generally "seminal institutional research". This will help understand the difficulties encountered in applying these theoretical frameworks to a field such as IS.

2.1. Sources of institutional and neo-institutional frameworks: what is an institution?

An institution implies both a system of social rules and a framework making it possible to locate and compare objects and people. Following a more normative stance, Scott (2001) defines an institution as a 'social structure' which gives organizations and individuals lines of action and orientations by controlling and constraining them. Emphasizing the constraining powers of institutions, Barley and Tolbert (1997: 94) state that an institution "represent(s) constraints on the options that individuals and collectives are likely to exercise, albeit constraints that are open to modification over time".

Beyond these definitions, we will see in the next section the plurality of institutionalist stances, all emphasizing the presence and solidity of institutions in social life, but relying on different interpretations of rules, social structures, social orders, legitimacy and agency.

2.2. Institutionalism: seminal frameworks

Institutions, the specific social structures examined by institutionalism, have been the subject of numerous analyses from diverse points of view including economics, sociology and organization theory. Table 1 provides an overview.

	Indicators	Levels	Social Order	Legitimacy	Agency
Old Institutionalism Main proponents:					
Commons	"Operating rules" Laws	Institution World system / societal	Economic activity	Natural rights	Transaction
Veblen	Habits of thought	Institution World system / societal	Meaning	Values	Inspiration
Transaction Cost Economics *Coase* *Williamson*	Formal rules	Firm / Organization	Economic activity Regulative rules	Cost of market use vs. organization Legally sanctioned	Transaction
Neo-Institutionalism (Sociology) *DiMaggio & Powell* *Scott, Meyer, Rowan*	Common belief Shared logics of action	Social network Organizational fields World system	Constitutive schema	Comprehensible Recognizable Culturally supported	Imitation-convergence Imitation-

		/ societal / organizational			convergence

Table 1. Overview of institutional theoretical frameworks (adapted from Scott, 2008

Commons, Veblens

Among the original works in this field of research, one should mention Commons (1931, 1950) and Veblen (1898). For Commons, an institution is a framework of laws or natural rights, a "collective action in control, liberation and expansion of individual action" (1931: 648). For him, the smallest unit of economic activity is called a "transaction" (a well-known notion which will later become the basis of Williamson's theory) (Williamson 1975):

"Transactions are not the "exchange of commodities" but the alienation and acquisition, between individuals, of the rights of property and liberty created by society, which must therefore be negotiated between the parties concerned before labour can produce, or consumers can consume, or commodities be physically exchanged" (Commons, 1931: 649).

According to Commons, action is at the heart of the production and reproduction of order and "operating rules".

For his part Veblen (1898) stresses the notion of habits of thought that are structured by institutions and which ultimately live inside us and structure our way of thinking. He rejects any form of determinism: "As Thorsten Veblen (1898) insisted, these habits of thought provide both the conceptual frameworks of meaning and enquiry, and the systems of values that ground our inspirations" (Hodgson, 1999: 28).

Other contributors including Marx, Berger, Luckman, Mead, Cooley and Selznick (Scott, 2004) can also be mentioned. Their contributions to the definition and conceptualization of institutions and social structures have been used by many neo-institutionalists in the field of economics (Schmitter, 1990) and sociology (Drori et al., 2006). These fields have more or less explicitly appropriated the institutionalist heritage by applying it to a new research object, namely the organization.

Transaction Cost Economics

In the field of economics, Williamson (1975) has used Commons's notion of 'transaction' to extend some aspects of Coase's research (1937) about the nature of the firm. But, surprisingly, Veblen and Commons are rarely mentioned by Coase and Williamson (Rojot, 2005). A key research question in transaction cost economics (aka 'new institutional economics') has evolved around the comparison between cost of market use and cost of organizations (Gomez, 1996; North, 1990); the goal being to explicitly include organizational institutions (as opposed to the State as the level of analysis of institutional theories) in economic analysis. This has also been applied to the different institutional shapes assumed by firms. The legacy of the so-called 'old institutionalism' is, however, rarely claimed by transaction cost economists.

Neo institutionalism (sociology)

In the field of sociology, the relationship and continuity between old institutionalism and neo-institutionalism is often implicit (i.e. Commons and Veblen are not quoted) but real (Scott, 2004; Hodgson, 2004). The idea is to represent organizations as linked together and constructed by their environment (Rojot, 2005). Scott (2004) proposes regulative, normative and cultural-cognitive "pillars" of institutional works based on how institutions and institutionalisation are generated by different natures of pressures, compliance, and legitimacy within and between organisations. All these sociological perspectives are more or less present in the institutional literature about organizations (Ibid).

According to sociological neo-institutionalists, organizations belong to common "organizational fields" where populations of organizations experience certain common institutional constraints. Beyond a quest for efficiency and effectiveness, organizations seek legitimacy with regard to customers, suppliers, governments and society as a whole. This induces them to conform to different isomorphic pressures (coercive, normative and mimetic isomorphism, see DiMaggio and Powell, 1983, 1991). In the field of political science, Hall and Taylor (1996) further distinguish between rational choice institutionalism, historical institutionalism, and sociological institutionalism. Rational choice institutionalism is mainly related to economics (e.g. transaction cost economics), whereas historical and sociological institutionalism have a more social orientation.

Today, neo-institutionalism in sociology can be divided into several streams, all structured around distinct leaders (Scott, 2004). On one side are DiMaggio and Powell and on the other, Scott, Meyer and Rowan. The former have

instrumentalised the concept of institution by means of the notion of "social network". The latter rely on symbolic models.Macro or micro (Scott, 2004) levels of analysis provide another way of shedding light on the various neo-institutionalist sub-streams. Institutionalists also introduce other central concepts such as cultural persistence (Zucker, 1977) vs. cultural change.

Conclusion

Clearly, most institutionalists do not defend a determinist stance (e.g. people can transform institutions). And, after a period during which neo-institutionalists (in particular those with a social focus) emphasized external and constraining social structures, some now tend to offer a conceptualization of social structures which is quite close to Giddens' (1984) view (see also Currie and Swanson, 2009). Scott (2004) thus insists on the virtuality of social structures that are only instantiated through agency.

3. Research method

To explore how these institutional theoretical frameworks have been drawn upon in the IS research literature, we used a unique combination of techniques of data collection, processing and analysis, rarely used in IS research. The overall research strategy we followed is described in Table 2.

RESEARCH OBJECTIVE	METHOD	RESULTS
Phase 1: Identification of IS empirical articles dealing with institutional theoretical frameworks	Selection of papers from two databases (EBSCO, ABI) Selection of relevant papers	107 empirical articles from 1999 to 2009
Phase 2: Identification of main institutional theoretical frameworks quoted in empirical articles. Classification of their relationship with seminal theories.	Main relationship with theories	Three relationships with theories are identified (direct, intermediary and combined).
Phase 3: Analysis of methodological choices used to apply institutional approaches	Descriptive and thematic analyses	- Iterative design of a thematic dictionary of 'categories' based on sample. - Manual coding of papers. - Analysis of distribution of papers according to these categories.

Phase 4: Identification of groups of articles using similar applications of institutional frameworks	Cluster analysis (Kmeans) enabled by a canonical analysis ↓ ANOVA test and discriminant analysis	- Emphasis on 'dimensions' structuring the data. - Evaluation of groups of papers, according to broad application of institutional theoretical frameworks. - Validation of the cluster analysis: confirmation of the discrimination of dimensions and validation of the classification index of 'modalities'.

Table   2: Presentation of the research method to analyze the selected papers for cluster analysis

Our first priority was to identify institutional and neo-institutional papers with empirical ambitions. We used several databases (detailed in the next section) to identify them. Once the selection was completed, we carried out a descriptive analysis (for instance, distribution of papers per year). Finally we performed a cluster analysis to obtain longitudinal and cross-category analyses. This was also a way of putting forward a taxonomy of empirical papers. Each phase is detailed below.

3.1. Data Collection

Our primary objective was to find empirical IS research articles drawing on institutional or neo-institutional theoretical frameworks. Institutional IS papers with only theory were not included in the analysis.

For data collection we relied on the EBSCO and ABI databases for articles from 1999 to 2009. After identifying specific search terms , we compiled a set of texts corresponding to our core target, namely institutional or neo-institutional papers with an empirical component. Cross validation was carried out by two co-authors of this paper. They separately processed the initial results of our search query. Their opinions diverged for 50% of a pilot initial sample, so these cases were discussed in depth . Our experience in the field of institutional research also helped us in the selection of papers given that several co-authors of this paper have been involved in previous institutional empirical research.

3.2. Coding of Articles

The final set of papers (Appendix 1) was then coded manually by means of thematic coding as described by Huberman and Miles (2002). Several co-authors collectively created a thematic dictionary using the following procedure described by Weber (1990):

i) Creation of a first detailed definition of a preliminary set of categories, to allow starting with a first, common representation for the coding.

ii) A further sample of 20 papers was coded by three co-authors, resulting in several discussions about the initial categories. This first round was an opportunity to refine the definition of some categories and also to add new categories. This was reiterated until researchers reached a consensus on the thematic dictionary and the way it should be used. It was a benchmark for the remaining coding process.

iii) Individual coding of the other articles, using the categories resulting from the preliminary test and the refined definitions of each identified category.

iv) Comparison of the 107 journal articles selected to check and confirm the relevance of the coding scheme.

The categories included in the thematic dictionary are shown in Table 3.

CODE (name of the category – variable later used in cluster analysis)	MODALITIES	COMMENTS
Methodological approaches	Action-research, survey, case study, experiment, meta-analysis (i.e. analysis of a set of pre-existing empirical research), hybrid approach (combination of these modalities)	
Level of analysis	Societal, inter-organizational, intra-organizational	
Period of publication	Year of article publication	
Target	Specific technical concept, specific information technologies, or information systems in general	
Nature of data collection	Short or longitudinal case study	
Nature of data analysis	First generation of quantitative techniques: simple or multiple linear regression, descriptive tests, etc; Second generation quantitative techniques: structural equation modelling (such as LISREL or PLS), factorial analysis, dependency network diagrams, logistical regression, game theory techniques… Unstructured qualitative methods (no coding or thematic dictionary was mentioned); Structured qualitative methods (with coding and analysis of the coding)	When the paper did not specify how qualitative data analysis was achieved, we assumed that it was unstructured data analysis. At first we wanted to create a hybrid category (corresponding to combinations of our four main methods) but we did not find such hybrid use in any paper. All the examples clearly fit into a dominant research strategy.
International comparison	Yes or no	The intention was to measure the number of empirical papers with intercultural comparisons
Sector approach	Intra-administration sector, intra-manufacturing industry, intra-agricultural industry, intra-service industry, cross-sector	
Theoretical framework /applied/implemented	Mainly or partly institutional (i.e. old institutionalism); Mainly or partly neo-institutional in the field of sociology (e.g. Scott, Meyer, Rowan, DiMaggio, Powell); Mainly or partly institutional in the field of economics (e.g. Williamson and Coase, more generally the "new institutional economics"); Mixed or with an implicit positioning.	When it was explicit in the paper, we followed the positioning suggested by the authors themselves.
Type of journal	Management, IS management, or others	

Table 3: Thematic dictionary

3.3. Data Analysis: from descriptive to cluster analysis

The four phases of our research method are described in Table 2. Two types of analysis were carried out: a descriptive analysis using our thematic coding and a cluster analysis based on canonical analysis. In the first phase, the coding of the articles was the object of a descriptive (and numerical) data analysis. The objective was to provide an overall description through counting codes and categories and their evolution over the years. Then, to work out a classification of the literature, a cluster analysis was performed by means of canonical analysis (Overals type, see Valette-Florence 1998 for a justification of the tandem analyses). The Overals algorithm was first described in Gifi (1981) and Van der Burg, De Leeuw and Verdegaal (1988). Characteristic features of Overals (conceived by De Leeuw, 1973) are the partitioning of the variables into K sets and the ability to separately specify any of a number of measurement levels for each variable. Similarly to multiple regression and canonical correlation analysis, Overals focuses on the relationships between sets. For further information, see Appendix 2, Section 2.1.

To perform this kind of analysis, some data modification was required, i.e. regrouping of some 'modalities' (see Appendix 2, Section 2.3 for the final thematic dictionary) whose numbers of answers were too low, resulting in 39 modalities instead of the initial 41.

The construction of sets of variables is also an input of the Overals process. This was achieved through several successive iterations making it possible to highlight three sets (see Appendix 2, Section 2.2). These sets were identified from the meanings of the variables. Some variables defined the method used, others described publications, and some specified the research topic.

- Set 1: variables describing the method used in articles (methodological approach, nature of data collection, nature of data analysis);

- Set 2: variables describing publications (period and subject of publications);

- Set 3: variables describing the research topic (level of analysis, target, sectorial approach, topic, theoretical framework used, presence of an international comparison or not).

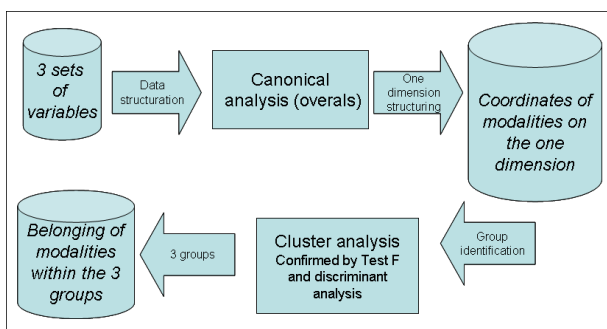The figure below summarizes all the dynamics:

Figure 1: Global roll out of the canonical and cluster analyses

4. Main results

In the second research phase we identified the main institutional theoretical frameworks quoted in empirical papers and we present them in Section 4.1. The third phase analysed the methodological choices used when applying institutional theoretical frameworks and are presented in Section 4.2. These two phases constitute our descriptive analysis. The fourth phase used cluster analysis to identify groups of papers applying institutional theories in similar ways and is presented in Section 4.3.

4.1 Major Institutional and Neo-institutional Theoretical Frameworks used in IS: from direct to combined uses

Many of our selected empirical papers refer to a small set of papers on the theory and history of institutional research in IS, namely Orlikowski and Barley (2001), Kling and Iacono (1989), Swanson and Ramiller (1997, 2004), Tornatzky and Fleischer (1990), Meyer and Rowan (1977), King et al. (1994, 2001), Limayem and Hirt (2003), Loebbecke and Huyskens (2006) and Cordella (2006). We revisited these theoretical papers to better understand how IS research has incorporated these institutional theoretical frameworks and the (older) seminal papers they quote. This helped us identify three main ways in which our selected papers use institutional theoretical frameworks. This is described below.

Some papers carry out 'pure' or 'direct' institutionalist research to follow multiple stakeholders and institutions over long periods of time (e.g. de Vaujany, 2007; Avgerou, 2000). Some IS institutional researchers borrow and adapt institutionalist concepts into an 'intermediary' framework; whilst others 'combine' selected constructs from institutionalism and other 'grand' social theories to analyze empirical work (e.g. Wang, 2001; Firth, 2001; Backhouse et al., 2006). Thus, three uses of institutional theoretical frameworks seem to appear in the IS literature: **direct** use of institutional concepts; a specific **intermediary** framework is developed; or institutional theoretical frameworks are **combined** with other theoretical frameworks such as Actor-Network Theory or Structuration Theory. We illustrate each below with some of our selected empirical papers.

4.1.1 Direct use

Some researchers (Avgerou, 2000; de Vaujany, 2007) directly use institutional concepts. They stay at the meta-perspective level and do not develop an intermediary framework (derived from institutionalism) or combine institutionalism with other theories. For instance, de Vaujany (2007) directly applies concepts such as "organizational fields" to the analysis of information and communication tools within the Roman Curia in the Vatican. No specific concepts are used or developed to make sense of IT-related phenomena.

The epitome of this direct or pure approach is found in transaction-cost oriented papers (the bulk of which deal with outsourcing). Most recent papers are comparative (putting the transaction cost model into perspective with other theoretical frameworks such as the resource-based view). Notions of "transactions", "asset specificity" or "atmosphere" are directly used to make sense of technological adoption. Seminal frameworks are not modified to make sense of IT phenomena.

4.1.2 Intermediary use

'Middle range' theories have been described as

"theories that lie between the minor but necessary working hypothesis and that evolve in abundance during day to day research and the all inclusive systematic efforts to develop a unified theory that will explain all the observed uniformities of social behaviour, social organization and social change." (Merton, 1968: 41).

Markus (2004:28) explains that in functionalism, middle range theories "have a definite substantive focus (e.g. theories of revolution, state formation) and are claims to generalize to all specific instances of their class of phenomena (e.g. all revolutions or state formations)". We use the term 'middle-range' more loosely here, i.e. in a less functionalist way , following Weick (1995) and DiMaggio's (1995) discussion of theory use and development in management studies. Weick (1995:385-386) argues that

"products of the theorizing process seldom emerge as full-blown theories, which means that most of what passes for theory in organization studies consists of approximations (…) theory is less a product than a process (…) they have gradations of abstractness and generality (…) theory is a continuum rather than a dichotomy".

Similarly, DiMaggio (1995:391) claims that "there is more than one kind of theory" and that they range from "covering laws" and "enlightenment" to "narratives".

Therefore, what we see here as IS middle range theories are both a theorization and a focused (i.e. centered on specific IS phenomena such as IT adoption) conceptualized framework. Such is the case of the 'organizing vision' offered by Swanson and Ramiller (1997, 2004), or King et al.'s (1994) institutional 'regulatory' approach to IS.

The organizing vision (OV) concept is derived mainly from institutional isomorphism, and assumes that there are focal ideas related to technology which are produced or reproduced and appropriated by an inter-organizational community (Swanson and Ramiller, 1997). This discourse helps to make sense, legitimize and mobilize people in the adoption of IT. Swanson and Ramiller (1997) invite researchers to trace OVs in specific forums (journals, conferences, trade shows…) and suggest that they take the shape of buzzwords or discourses which can be systematically analyzed (see also Carton, de Vaujany and Romeyer, 1997 for an analysis of the uses of the OV model).

King et al.'s (1994) regulatory approach is also sensitized by institutional constructs to explain the dynamics of innovative changes in the IT domain. The authors build a matrix to provide an understanding of the role of institutions in IT innovation. Their matrix highlights that institutional intervention can be constructed at the intersection between the influence and regulatory powers of institutions, and the ideologies of supply-push and demand-pull models of innovation. For them, the power of institutional intervention can either be an influence ("the exerting of persuasive control over the practices, rules and belief systems" p.149), or a regulation ("direct or indirect intervention in behavior" p.149). Influence and regulation can play different roles depending on the "supply-push" or "demand-pull" forces driving the innovation. Moreover, in each of the four cells that compose the matrix, the authors provide examples of types of specific actions in which institutions might engage. Each of these actions can be classified as one of six general types: knowledge building, knowledge deployment, subsidy, mobilization, standard setting, and innovation directive. Thus, the authors offer an interesting framework to analyze the multifaceted role of institutions in the IT innovation process. It can be seen that these two papers apply institutional theoretical frameworks by offering two intermediary middle-range theories focused on IS phenomena.

4.1.3 Combined use

Some empirical IS articles base their analysis on a mix of institutional approaches and other approaches such as structuration theory (Thatcher et al., 2006; Barrett, Sahay and Walsham, 2001, Limayem and Hirt, 2003), actor network theory (Backhouse et al., 2006) or both (Chae and Poole, 2005). Conceptualization tends to be based on the 'other' theory. For example Backhouse et al. (2006) examine the institutionalization of information security standards using the theory of 'power circuits' (Clegg, 1989). This provides them with more precise middle-range concepts, allowing them to include external institutional forces and contingencies – powerful agents, resources, meanings, and relevant social and institutional groupings. They also use the middle range concept of 'obligatory passage point' (from actor-network theory) and apply it to the role of standards. Such papers may also use methodological approaches advocated in the 'other' theory they draw from, for instance ethnographic methods in actor-network theory. Table 4 outlines the three main uses of institutional theories in the IS literature.

	DIRECT	INTERMEDIARY		COMBINED
Principle	Institutional theoretical frameworks and concepts are directly applied to IS objects.	A specific intermediary theory is developed to make sense of IS objects. This does not just rely on other theories or concepts, it is not just an importation. Two appear in the literature;		Institutional theoretical frameworks or concepts are combined with other meta-theories (e.g. structuration theory, actor network theory).
		the regulatory vision (King et al., 1994),	the appropriation vision (Swanson and Ramiller, 1997).	
Role of institutions	Institutions are specific social structures (in strict accordance with institutional writings).	Institutions are forces of regulation or influence on IT.	Institutions influence adoption of a technology at the organization or micro level, which in turn feeds the evolution of institutions.	Institutions are specific social structures alive in organizations.
Examples	Avgerou (2000); de Vaujany (2007).	Damsgaard and Lyytinen (2001); Montealegre (1999); Damsgaard and Scheepers	Wang (2001); Firth (2001); Wang and Swanson (2007); Carton, de Vaujany and Romeyer (2007); Bureau	Miranda, Kim; (2006), Srivastava, Teo (2006); Limayem, Hirt, (2003); Backhouse et al. (2006); Thatcher et al. (2006);

		(1999); Silva and Figueroa (2002).	(2006); Tiwana et al. (2003).	Barrett et al. (2001); Chae and Poole (2005).

Table 4: Three main uses of institutional and neo-institutional theoretical frameworks in IS research: direct, intermediary and combined

Interestingly, it seems that (direct, intermediary, or combined) relationships with seminal frameworks also apply to structurational IS literature as described by Jones and Karsten (2008). Some IS research directly applies Giddens' concepts (Walsham, 1993). Others rely, more or less faithfully on Giddens' structuration theory (see Jones, 1999) for specific concepts or frameworks; examples of this are the Technology-In-Practice lens developed by Orlikowski (2000) or Desanctis and Poole's (1994) Adaptive Structuration Theory. Lastly, some authors combine structuration theory concepts with other concepts or frameworks, for instance Walsham and Sahay (1999) who combine Structuration Theory with Actor-Network Theory. There may be similarities with our findings if a systematic comparison was carried out on the use and application of structuration theory in IS research, especially as it has been used for longer than institutionalism.

4.2 Descriptive analysis of the thematic coding

Analysis of the EBSCO and ABI databases resulted in the identification of 107 journal articles matching our criteria between 1999 and 2009. We were struck by the regular increase of empirical papers in recent years, in particular for 2006, 2008 and 2009. Taken together, 2008 and 2009 provide 54% of the total number of publications (see Figure 2 and Appendix 3 to see the distribution into modalities). We see in this a need for evaluation and adaptation of seminal institutionalist ideas to IT issues.
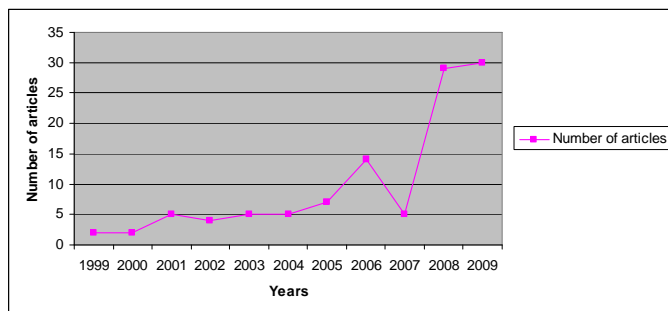

Figure 2: Evolution in number of articles from 1999 to 2009

More generally, our thematic analysis resulted in the following points summarised in Table 5.

KEY RESULTS
Case-study based research (41.1%) Mainly organizational (43.9%) or inter-organizational (33.6%). Societal and multi-level analyses are rare[1] Surveys represent 42.1 % of the database, but dominate in top ranked journals
A majority of qualitative studies based on a longitudinal perspective
Main theoretical framework applied in the empirical literature: the sociological stream of neo-institutionalism (30%)
Half of the studies are conducted in a cross cultural environment
Dominance of the direct neo sociological framework (30.8%) compared with the neo economics framework (7.5%)

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[1] This confirms Currie's 2009 result about levels of analysis.

Direct use of institutional concepts : 38.3% (2 modalities : MAIN NEO SOCIO AND MAIN NEO ECO)
Intermediary frameworks : 45.9% (3 modalities MARG NEO, MARG NEO SOCIO, OTHERS)
Combined frameworks : 15.9% (1 modality COMB)

Table 5: Key results from the descriptive analysis

Article coding according to methodological approaches shows that case-study based (41.1%) and surveys (42.1%) are the two main approaches used.

Case studies are more prominent in second tier journals, suggesting that they may be more difficult to publish in top ranked journals. Another possible explanation is that case studies are not of sufficient quality, so get published (in large numbers, around 50%) in second tier journals. Furthermore, the distribution of the three uses of institutional theoretical frameworks shows a dominance of the intermediary use (45.9%). This dominance varied over the period studied. Combined and intermediary uses emerged only at the end of the period, between 2008 and 2009.

We found a dearth of research focusing on the adaptation or post-implementation phase. This is in line with Liang et al.'s (2007: 60) invitation:

"While it is reasonable to assume that institutional forces and top management, critical to successful adoption and implementation of ERP systems, might still be influential in the assimilation stage, we submit that a theoretical explanation regarding the effects of these factors on ERP assimilation during actual usage is still underdeveloped. Theory based empirical studies with a focus on the post-implementation assimilation of ERP systems, and on IT innovation in general, are clearly called for."

We found that most of the methods and empirical devices employed in the studies only included those individuals deciding to implement the technology. Other stakeholders involved in the later phases of use and assimilation, such as top managers, users from the various departments or subsidiaries, line managers, supervisors, team leaders, external customers and suppliers, were seldom considered.

4.3 Taxonomy of Empirical Articles

The results of the Overals analysis highlight two 'dimensions' in our population of articles. Finding the number of dimensions relevant for the cluster analysis was carried out by means of a Scree test, identifying two dimensions (with an inflexion point after these two dimensions, see Appendix 4.1). These two dimensions correspond to 64.7% of the variances explained (see Appendix 4.2 for details).

Based on the canonical analysis (Overals) using coordinates of modalities along the two dimensions, a cluster analysis helped us put forward three groups of articles corresponding to three specific ways of using institutional theoretical frameworks (see Appendix 4.3). These three groups were then validated by means of an ANOVA and discriminant analysis prior to final interpretation (see Appendix 4.4). The three groups identified by means of our cluster analysis (Kmeans method) are described in Appendix 5. Table 6 presents the classification of the modalities in each group.

CLUSTER	MODALITIES
1 **Description, exploration** *No specific use of theory*	CASE STUDY, LONGITUDINAL, QUALI NON STRUCTURED, INTRA ORGANISATIONAL, YEAR 1999, YEAR 2000, YEAR 2001
2 **Nomothetic analysis** *Direct, combined and intermediary uses of theory*	SURVEYS, EXPERIMENTATIONS, CROSS SECTIONAL, QUANTI FIRST GEN, QUANTI SECOND GEN, OTHER JOURNALS, MANAGEMENT JOURNALS, TECHNICAL CONCEPT, CROSS ORGANISATIONAL, NO, YES, CROSS SECTORIAL, INTRA SECTORIAL, MARG NEO ECO, MARG NEO SOCIO, MAIN NEO ECO, OTHERS, COMB, YEAR

	2004, YEAR 2005, YEAR 2008, YEAR 2009
3 **Neo sociological approach** *Direct use of theory*	OTHER METHODS, QUALI STRUCTURED, IS JOURNALS, IS IN GENERAL, SOCIETAL, MAIN NEO SOCIO, YEAR 2002, YEAR 2003, YEAR 2006, YEAR 2007

Table 6: Classification of the modalities among the three groups

Table 6 shows the distribution of the 39 modalities into three main groups. There is relative homogeneity in the distribution of modalities within these three groups. There are 7 modalities for Group 1, 22 for Group 2 and 10 for Group 3.

Group 1 is identified as "**descriptive exploratory approaches**"; it gathers modalities such as CASE STUDY, LONGITUDINAL, QUALI NON STRUCTURED, and INTRA ORGANISATIONAL. Years 1999, 2000 and 2001 appear in this first group that is characterized by a very specific methodology: case study, longitudinal data collection, non-structured qualitative data analysis, and an exclusively intra organizational level of analysis. The last characteristic is the absence of specific theorizing. We suggest (particularly in view of the years) that this group is exploratory. These articles do not apply any specific institutional theories so they cannot be classified into the direct, intermediary or combined uses we identified in our descriptive analysis in the previous section. Group 1 corresponds to the beginning of research into MIS institutional theoretical frameworks with little or no theorization and no sophisticated methodologies.

Group 2, labelled "**generalizing nomothetic analysis**", is characterised by modalities such as SURVEYS, EXPERIMENTATIONS, CROSS SECTIONAL, QUANTI FIRST GEN, QUANTI SECOND GEN, OTHER JOURNALS, MANAGEMENT JOURNALS, TECHNICAL CONCEPT, CROSS ORGANISATIONAL, NO, YES, CROSS SECTORIAL, INTRA SECTORIAL, MARG NEO ECO, MARG NEO SOCIO, MAIN NEO ECO, OTHERS, COMB, referring to two periods , namely years 2004, 2005, and years 2008 and 2009. These articles carry out a clear quantitative analysis from data collected in more than one firm, and study a specific technical object (such as ERP, CRM, etc…). The associated theoretical frameworks are neo-economics, partly neo–economics or partly neo-sociological. These studies are conducted in one or several countries (NO, YES). The direct, intermediary and combined uses of institutional theoretical frameworks are all represented in this group; Year 2008 and Year 2009 are part of this group and define a period where researchers massively mobilized intermediary and combined uses specifically. We can define this group as nomothetic, meaning that theorizing efforts seek to provide generalizations through all possible ways of applying institutional theories. It aims at testing rather than qualifying or modifying institutional concepts (see Currie, 2009 for a criticism of this type of work). This group conforms to dominant standards familiar to management researchers: focus on one specific technology and use of quantitative methodologies. It is published in general management journals and not IS journals.

Finally, modalities such as OTHER METHODS (META, HYBRIDS), QUALI STRUCTURED, IS JOURNALS, IS IN GENERAL, SOCIETAL, MAIN NEO SOCIO are part of Group 3 entitled "**Neo sociological approach**". Group 3 is smaller in size than Group 2. Two periods are associated with this group: years 2002-2003, and years 2006-2007. It is characterized by a clear theoretical framework relying mainly on the sociological institutional field (MAIN NEO SOCIO). Articles are published in IS journals. The objects of analysis are not specific technologies but rather IS in general, with a societal perspective. Methodological approaches are meta analysis (using sets of pre-existing empirical research) or hybrid (mixed methods). The two periods making up this group of articles (2002- 2003, and 2006–2007), represent an evolution and a later stage in the use of institutional theoretical frameworks in IS research. Direct use of institutional theoretical frameworks (MAIN) is the only way this group theorizes. No intermediary concepts are mobilized, so direct application of original institutional theory dominates. It uses less common methodologies, with a societal perspective and a more original approach than the usual management perspective. It addresses IS researchers and the articles are published in IS journals.

It seems that Group 1 corresponds to the emergence of institutional approaches in IS with an exploratory stance; Groups 2 and 3 embody two different parallel trajectories of empirical research on IT and institutions. It remains to be seen whether this phased approach corresponds to a general cumulative cycle of theory construction, or whether other factors also have an influence on disciplinary conceptual development.

5. Discussion, contributions and avenues for further research

This paper explores the ways in which institutional theories are applied in the IS empirical research literature. At this juncture, it is worth bringing in Gregor's (2006: 611-613) distinctions between different types of theory. She distinguishes between five types: types I (analysis) and II (explaining) which both follow a sociological research model; and types III, IV and V (prediction, design and action) which all adopt a more scientific model. The last three are variance-type theories and are used in the majority of IS research. Their components include causal explanations, prescriptive statements, testable propositions and hypotheses that aim at generalization and are, arguably, easier to operationalize through variables and statistical analysis.

Types I and II are process-type theories; they are statements of relationships (not causality) providing a lens for viewing or explaining the world, and explanations of sets of events based on a story or historical narrative. They have been less prominent in IS research. Gregor (2006:613) cites the example of structuration theory used to explain the organizational consequences of IT as the products of both material and social dimensions. This is at a high level of abstraction and the scope of the object of study is large. This means that the concepts cannot be operationalized as such (unlike types III, IV and V) and there are more difficulties in theorizing, developing and applying process-type concepts.

We can conclude that the use of institutional theoretical frameworks in IS research seems to have taken place in the following forms: explore and describe without theorization; generalize through applying all possible ways of theorizing, particularly through intermediate and combined uses of concepts; and theorize sociologically through direct use of institutional concepts.

Perhaps some of these forms also result from institutional pressures specific to the IS discipline and its search for academic legitimacy, leading IS researchers to conform to the scientific expectation of cumulating knowledge, and to writing conventions and acceptable rhetorical structures found in top ranked journals (see de Vaujany et al., 2011). In such a small community, representing a young discipline with a weak identity and lack of credibility, it is probably safer to comply with external dominant standards rather than explore totally new ideas. Few dare do it, and most develop various tactics to seek legitimacy. These tactics can include referring to meta theories to gain credibility without fully engaging with them theoretically; developing intermediary concepts specific to the IS field (e.g. the organising vision) to demonstrate generalization to consolidate IS as a scientific discipline; or combining with other meta theories to gain more credibility. Therefore intellectual difficulties and institutional constraints both seem to play a role.

5.1 Theoretical, empirical and methodological contributions

Our first contribution relates to examining the evolution of the IS research discipline and its incorporation of theory construction, methodological approaches and empirical focus. This is fundamental to understanding any discipline, yet these aspects are rarely looked at simultaneously. Mignerat and Rivard (2009) for example, provide an overview of those institutional theories that have contributed to IS research, but they do not analyze the theorizing process itself (e.g. the development or use of specific intermediary concepts).

Our results confirm the dynamism of the IS institutional research stream, as evidenced by the increase in number of articles between 1999 and 2009. We also highlight a certain conformity in methodological, theoretical and empirical terms. Looking at the IS research field through the lens of institutional theory can be relevant in as much as phenomena like dominance of certain types of research (cross sectional) but not others (cross-cultural studies) and different mechanisms for theory construction have been identified.

The IS institutional research stream remains dominated by cross-sectional empirical studies in which a quantitative nomothetic mode of operationalization (types III, IV, or V) dominates, especially in top ranked journals, as already noted by Currie (2009). She found fewer studies on the processes of institutionalization than on the effects of institutionalism. We complement this through our findings that: cross-cultural aspects have remained under-explored; and few papers propose an innovative methodological approach, such as mixing quantitative and qualitative techniques, whether from a cross sectional or longitudinal perspective.

We also found that IS researchers have evolved from untheorized exploration (Group 1 of our cluster analysis, see Table 6) to building intermediary theories and concepts to make sense of empirical dynamics. IS scholars have needed to build IS-relevant intermediary concepts to apply institutional theoretical frameworks, leading to a variety of frameworks which are only marginally anchored in the institutional field. One interpretation of this can be that inclusion of technology and its materiality into discussions about institutions may require both adaptation of institutional concepts (intermediary), and mobilization of other theoretical frameworks (combination) which

concentrate on technical artefacts (e.g. actor network theory). Both are represented in Group 2. This tendency was particularly pronounced in 2008-09, possibly after a maturation process of the research field.

We can explain this through a pattern of IS research in its use of meta theories: first untheorized exploration (Group 1); then both, in parallel: a search for nomothetic generalization using intermediary and combined uses of institutional concepts (Group 2); as well as a full application of neo-institutional approaches through direct use of institutional theories which are closer to seminal works (a smaller Group 3). These may be necessary disciplinary stages the field of IS has to go through to address the specificities of its object of study, and to fully engage with, and possibly contribute to social theories. Niederman et al. (2009) have argued that using 'reference discipline theories' in IS research should be encouraged and broadened – although they also examine their harmful effects and propose alternatives aimed at building and expanding indigenous IS theory, such as metatriangulation , and IS as a practical science or design science.

This quest for legitimacy and disciplinary identity by IS researchers reflects institutional pressures within the IS research environment. A better understanding of the relations between the institutional academic pressures we deal with and their effects on our intellectual journeys may foster higher levels of reflexivity and innovative conceptualization and different writing practices and may ultimately be more useful for developing strong theories.

At this stage, we can identify a reasonable explanation for our findings. Journal editors and reviewers (and probably authors themselves) may well understand the importance of sociological, longitudinal studies in institutional theoretical frameworks (types I or II, Group 3), but they may prefer economics orientated cross-sectional papers and surveys due to faster data collection; and to the fact that they do not require adaptation through the development of intermediary concepts, which is a more challenging option. This may account for the lack of specifically IS institutional theoretical frameworks and theory building strategies in IS institutionalist literature (Currie, 2009). Based on the research methods element that we included in our exploration, we can also suggest that more multi-level (micro, meso, macro) case study research may provide innovative thinking, possibly leading to stronger theorizing.

Our work also indirectly points to certain inconsistencies when compared to seminal writings in the institutional literature in terms of empirical time span. As Mignerat and Rivard (2005, 2009) point out, cross-sectional research dominates and contrasts with seminal institutional approaches; the latter require longitudinal study, long-term and systemic exploration of social institutions. We found that the bulk of the IS empirical literature uses mainly short-term (i.e. spanning only a few years at the most) case study approaches; it can lead to a lack of debates that enrich a discipline. This is not really in line with institutionalist ambitions, especially when compared with Veblen (1898) and his study of the emergence of a leisure class, or Kieser (1989) and DiMaggio and Powell (1991) in their analyses of formal organizations, where they follow long-term, secular organizational evolution. Of course, IS objects are recent and change rapidly, but their impact can also be assessed from a longer-term perspective than is currently done.

The final contribution we make is methodological. This research has provided an opportunity to examine the different ways of using and applying abstract theoretical frameworks. The concrete result is a set of criteria (i.e. the thematic dictionary) that supports their analysis. This set of criteria was validated through a collective process and the 107 articles that form the basis of our research were examined using this analytical grid. Beyond classic thematic and citation analysis, the combination of canonical and cluster analyses also provides an innovative way to map a stream of literature. Through a rigorous analysis process, it can highlight relations between a research topic, a specific methodology design (level of analysis, nature of data collection, nature of data analysis) and time of publication. This has not been carried out in the IS literature and has rarely been used in other management research fields. Apart from one application by Valette-Florence (1998) in the marketing field, we did not find any other studies using this integrated methodological approach to map research streams in the management field. The results are interesting: we constructed a set of groups which clarify the structure and evolution of empirical IS institutional research. As a result, and by way of comparison, we suggest further use of this methodology to analyze how the IS literature has drawn on other theoretical frameworks such as structuration theory or actor-network theory.

5.2 Further research

Our work can be extended in several directions, whether by PhD students, more advanced researchers interested in studying institutionalism and IS, or individuals wishing to gain a more general understanding of the structure of the IS research discipline.

We suggest pursuing a better understanding of the application of institutionalist theories through analysis of the evolution of intermediary concepts such as the "organizing vision" construct. In line with recent work by Currie (2009), we suggest that multi-level and combined modes could generate richer insights that may come from either mixing several sociological theories (as illustrated by Backhouse et al., 2006) which is still not very common in IS research, or by mixing economic and sociological theories (which may well be groundbreaking). This sort of study would also be particularly suitable for addressing cross-cultural aspects which we found have remained under-explored. Blending theoretical stances, methodological and empirical approaches may provide ideas for IS researchers, especially as institutionalizing and legitimating technologies is often assumed to be universal and acultural. It could also prevent institutional (what is possible and rewarded) isomorphism in our field. This may well be responsible for limited applications of institutionalist theories to analyze specific IT objects at one point in time, rather than longitudinal methodologies or 'direct' use of theory (Group 3), which is closer to seminal theories. Comparison of institutionalist IS research with IS research drawing on other reference theories (e.g. structuration theory) could be helpful to explore their own blends of theory use and application, methodological approaches and empirical objects.

More broadly, when using institutional approaches, it would be valuable to put the dynamic of organizations or populations of organizations into perspective over a long period of time, possibly using historical methods, still rarely used in IS research (Mitev and de Vaujany, 2012). Future research could potentially deal with the way actors have grappled with information issues over time. The study of very old institutions or administrations may be helpful. 'New history' methods and concepts might also be helpful in understanding isomorphism over very long periods of time (Le Goff, 2006). Innovative longitudinal research combining qualitative and quantitative techniques (e.g. Barley, 1986) could be developed to a greater extent by IS institutionalists (Currie, 2009). A future investigation of the structure of IS institutional research (in particular empirical studies) could analyze how certain specific institutional concepts ("organizational fields" or "isomorphism") have been applied.

In relation to the use of direct, intermediary and combined constructs we also suggest that the background and theoretical inclinations of researchers matter: quantitative researchers may prefer intermediary constructs to 'measure' things; whereas more qualitatively oriented researchers may directly import concepts from seminal frameworks to make sense of institutional dynamics. Interesting future research could try to correlate educational and professional backgrounds of researchers to their use of constructs and methods. Methodological interdependencies could then be explored in more detail in relation to ways of using and applying theory.

Finally, a cross analysis of IS institutional research with other management fields such as strategic management or human resource management could be a way of shedding light on specificities of the IS field. Combining the resource-based view across management and economics provides an example of a theoretical synthesis which has enriched theories of competitive advantage in the strategy field (Oliver 1997). Bowen and Weiersema (1999) have also compared the use of cross-sectional versus longitudinal methods in strategic management.

To conclude, according to Zahra and Newey (2009) management researchers frequently use three generic modes when building theories at the intersection of fields and/or disciplines. They are:

(1) Borrowing concepts/theories from one field or discipline and superficially intersecting with those of another;

(2) Borrowing concepts/theories from one field or discipline and intersecting with those of another in a way that extends one or more of the theories;

(3) Borrowing concepts/theories from one field or discipline and intersecting with those of another in a way that not only extends one or more of the intersecting theories, but transforms the core of fields and disciplines of which they are a part.

Zahra and Newey (2009) claim that the first and second are frequently used while the third is rarely used, yet the latter offers the most potential to have an impact across domains. They suggest that institutional theory (as well as organizational economics, population ecology or organizational learning) could inform sister disciplines such as marketing, international business, entrepreneurship, production management and human resource management. As IS researchers we should be open to some of these ideas to become more innovative in our investigation of the relationships between technology, people, organizations and institutions.

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APPENDICES

Appendix 1: Papers selected for analysis

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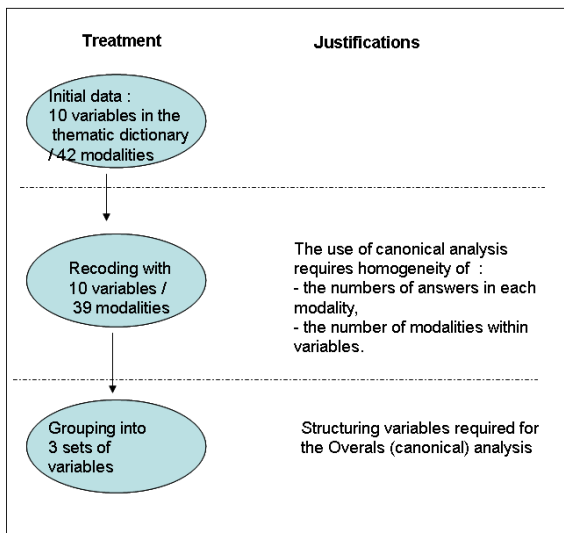
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APPENDIX 2: Cluster analysis and recoding modalities

2.1. <u>Canonical and cluster analysis</u>

Any particular variable contributes to the results only inasmuch as it provides information that is independent of the other variables in the same set. Moreover, it enables cluster analysis on initial variables that are heterogeneous (nominal versus continuous scales) and that are numerous (this is not the case for the correspondence analysis). When variables can be considered as grouped into sets, nonlinear generalized canonical analysis is an appropriate analysis technique (Biejlveld et al., 1999). The objective of such an analysis is the search for structuring elements in initial data (i.e. search for 'dimensions' that structure data).

2. 2 <u>Modifications to initial data to allow performance of canonical and cluster analyses</u>

2.3 <u>Presentation of the recoding process before Overals analysis (10 variables, 39 modalities)</u>

	VARIABLES	MODALITIES	RECODED MODALITIES
1	Methodological approaches	Action-research, survey, case study, experiment, meta-analysis (i.e. analysis of a set of previous empirical research), hybrid approach (combinations)	Case study (1), Survey (2), Experimentations (3), Other Methods (Hybrid and meta analysis (4)
2	Level of analysis	Societal, inter-organisational, intra-organisational	Cross-organisational (1), Intra-organisational (2), Societal (3)
3	Period of publication		Year 1999, Year 2000, Year 2001,Year 2002, Year 2003, Year 2004, Year 2005, Year 2006, Year 2007, Year 2008, Year 2009
4	Target	Specific technical concept, specific information technologies, or information systems as a whole	Technical concept (1), IS in general (2)
5	Nature of data collection	Short or longitudinal case study	Cross-sectional (1), Longitudinal (2)
6	Nature of data processing	-First generation of quantitative techniques: simple or multiple linear regressions, descriptive tests - Second generation of quantitative techniques: structural equation modelling (like LISREL or PLS), factorial analysis, dependency network diagrams, logistical regression, game theory techniques… - Unstructured qualitative methods (no coding and thematic dictionary was mentioned) - Structured qualitative methods (with a coding and treatment of the coding)	Quali non structured (unstructured qualitative methods) (1) Quali structured (Structured qualitative methods) (2) Quanti first Gen (First generation quantitative methods) (3) Quanti second Gen (Second generation quantitative methods) (4)
7	International	Yes or no	No, Yes

		comparison		
8	Sectorial approach	Intra-administration industry, intra-manufacturing industry, intra-agricultural industry, intra-service industry, cross-sector	Cross-sectorial (1), Intra-sectorial (2)	
9	Theoretical framework implemented	Mainly or partly institutional, mainly or partly neo-institutional in the field of sociology, mainly or partly institutional in the field of economics, mixed or with an implicit positioning	MARG Neo Eco (Partly neo institutional economics) (1) MARG Neo Socio (Partly neo institutional sociology) (2) MAIN Neo Eco (Mainly neo institutional economics) (3) MAIN Neo socio (Mainly neo institutional sociology) (4) OTHERS (other institutional frameworks) (5) COMB (Combined weak references of institutional frameworks) (6)	
10	Types of publications	Management, IS management or others	Management Journals (1), IS Journals (2), Other Journals (3)	

For example, the following modalities (intra-administration industry, intra-manufacturing industry, intra-agricultural industry and intra-service industry) were recoded into one modality for the variable "sectorial approach". This resulted in two modalities: intra-sectorial or cross-sectorial.

APPENDIX 3: Descriptive analysis of thematic coding applied to journal articles

Related variables	Modalities	Frequencies for the article database (ABI and EBSCO)	Percentage (%)
Methodological approaches	Case study	44	41.1
	Survey	45	42.1
	Experimentation	5	4.7
	Other Methods (Meta analysis, Action Research, Hybrid)	13	12.1
	Total	107	100.0
Level of analysis	Cross-Organisational (Inter-organizational perspectives)	47	43.9
	Intra-organisational (Intra-organizational perspectives)	36	33.6
	Societal (Societal perspectives)	24	22.4
	Total	107	100.0
Target	Technical Concept	47	43.9
	IS in General	60	56.1
	Total	107	100.0
Nature of data collection	Cross sectional	54	50.5
	Longitudinal	53	49.5
	Total	107	100.0
Nature of data processing	Quali non Structured (Unstructured qualitative research)	25	23.4
	Quali Structured (Structured qualitative research)	24	22.4

	Quanti first Gen (First generation quantitative research)	32	29.9
	Quanti Second Gen (Second generation quantitative research)	26	24.3
	Total	107	100.0
International comparison	No (Monocultural)	54	50.5
	Yes (Intercultural)	53	49.5
	Total	107	100.0
Sector approach	Cross-sectorial	54	50.5
	Intra-sectorial	53	49.5
	Total	107	100.0
Theoretical framework implemented	MARG Neo Eco (Partly new institutional economics)	8	7.5
	MARG neo socio (Partly new institutionalism sociology)	16	15.0
	MAIN neo eco (Mainly new institutionalism economics)	8	7.5
	MAIN neo socio (Mainly new institutionalism sociology)	33	30.8
	OTHERS (Institutional, others)	25	23.4
	COMB (combined theoretical frameworks :one is institutional)	17	15.9
	Total	107	100.0
Type of journal	Other journals	23	21.5
	Management journals (Journals in management)	49	45.8
	IS journals (Journals in MIS)	35	32.7
	Total	107	100.0
Period of publication	Year 1999	2	1.9
	Year 2000	2	1.9

	Year 2001	5	4.7
	Year 2002	4	3.7
	Year 2003	5	4.7
	Year 2004	5	4,7
	Year 2005	7	6.5
	Year 2006	14	13.1
	Year 2007	5	4.7
	Year 2008	28	26.2
	Year 2009	30	28.0
	Total	107	100.0

APPENDIX 4: Cluster analysis

4.1. <u>Choice of numbers of dimensions: Scree Test: 2 dimensions</u>

4.2. <u>Overals (canonical) analysis results with 2 dimensions</u>

		Dimension		
		1	2	Sum
Loss	Set 1	.190	.482	.672
	Set 2	.499	.284	.783
	Set 3	.326	.333	.659
	Average	.338	.366	.705
Eigen Value		.662	.634	
Fit				1.295

Percentage of restituted variances: Fit / number of dimensions: 1.295/2=64.7%

4.3. <u>Identification and validation of our groups by cluster analysis</u>

A cluster analysis of the coordinates by means of the Kmeans method resulted in three groups (see Appendix 5).

Validation of the cluster analysis was carried out by means of two tests.

An ANOVA (F test) shows that the three groups were significantly different on the two dimensions (sig 0.000).

ANOVA

	Cluster		Error			
	Mean square	ddl	Mean square	Ddl	F	Signification
DIM1	6.319	2	.215	36	29.326	.000
DIM2	5.868	2	.165	36	35.641	.000

The F tests should be used only for descriptive purposes because the clusters have been chosen to maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus cannot be interpreted as tests of the hypothesis that the cluster means are equal.

Additionally, a discriminant analysis of the coordinate validated the three group classifications, with a classification index of 97%.

Classification results

		Cluster number of case	Predicted group membership			
			1	2	3	Total
Original	Effectif	1	7	0	0	7
		2	0	21	1	22
		3	0	0	10	10
	%	1	100.0	.0	.0	100.0
		2	.0	95.5	4.5	100.0
		3	.0	.,0	100.0	100.0

a. 97.4% of original grouped cases correctly classified

Lastly, the table below shows relative homogeneity in the distribution of modalities within these three groups (clusters).

Cluster	1	7.000
	2	22.000
	3	10.000
Valid		39.000
Missing		.000

APPENDIX 5: Coordinates of modalities and their location on the map (Kmeans method)