

Maturing, Flagshipping and Piggybacking: On the Use of Structuration Theory in Information Systems Research

Completed Research Paper

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Abstract

The debate on structure and agency has a long-standing tradition in the social sciences. Developed by the British sociologist Anthony Giddens, Structuration Theory proposed the "duality of structure", the notion that structure and agency are inseparable in practice. Information Systems (IS) researchers have developed IS-specific adaptations of Giddens's ideas. We add to previous reviews on the use of Structuration Theory in IS by focusing on the adoption of individual concepts set forth by the theory and its IS adaptations. Based on our analysis of references to these concepts in the major journals and conferences we argue that the use of Structuration Theory in IS has matured over the past decade. We also find that some structural concepts are frequently used as flagships and in combination ("piggybacked"). Finally, we plead in favor of a more widespread use of agency as a fundamental concept of Giddens's theory.

Keywords

Structuration Theory, Adaptive Structuration Theory, Duality of Technology

Introduction

Information Systems (IS) researchers have found a productive tool in Structuration Theory. Developed primarily by the sociologist Anthony Giddens in the 1970s and 1980s, Structuration Theory is an account of the emergence, reproduction and transformation of social systems (Giddens 1976, 1979, 1981, 1984). The theory regards social relations as a product of the continuous interaction between the eponymous societal "structures" and active subjects. In their attempt to understand the relationships between technologies, organizations and individuals, IS researchers have frequently adapted Structuration Theory and applied this lens to wide range of phenomena. Such phenomena include, for example, mobile computing (Cousins and Robey 2005) and IT implementation (Heracleous and Barrett 2001). In the process, Structuration Theory has become one of the dominant theories of the social realm employed in IS (Poole and DeSanctis 2004). Sociology aside, IS has been among the disciplines that have proved to be most receptive to Giddens's ideas (Stones 2005).

A number of previous studies provide an overview of the use of Structuration Theory in IS. Jones and Karsten (2008) supply the most comprehensive one to date. Their literature review comprises four important contributions: (1) a conceptual discussion of Giddens's ideas in relation to IS research; (2) a

systematic exposition of the topics to which Structuration Theory has been applied in the field and in what ways; (3) an analysis of the implications for the use of social theory in IS; and, finally, (4) a detailed research agenda. Other reviews have focused on one or two of these four aspects (Jones 1999; Poole and DeSanctis 2004; Pozzebon and Pinsonneault 2005) or on specific topics such as public-sector IS (Veenstra et al. 2014) and knowledge management (Timbrell et al. 2005).

We add to these existing reviews by zooming in on the level of specific concepts that have been produced by Structuration Theory. We first identify fundamental concepts within the various IS research streams that apply Structuration Theory and then conduct a quantitative analysis of references to these concepts in IS literature. This approach enables us to identify developments and trends in the use of Structuration Theory at a more detailed level than previous literature reviews. From these trends we can draw lessons for future applications of Structuration Theory in the field.

The remainder is organized as follows. In the following section we briefly expose key concepts of Structuration Theory and its developments in IS. Then we introduce our method for data collection. In Section 4, we present the findings of our review and discuss them in section 5.

Structuration Theory and IS Research

Structuration Theory as devised by Giddens

Social scientists have discussed how people and their social environments interact in the debate on agency versus structure. Simply put, the controversy has been about whether people's behavior originates from their free will or is determined by the characteristics outside of people's control. While the starting point of this debate dates back to second half of the 19th century and the works of Émile Durkheim and Karl Marx, it reached its high point in the 1970s and 1980s and has remained one of the central sociological issues to this day. Giddens developed Structuration Theory to find a middle ground between objectivism and subjectivism (Cohen 1989). Objectivism puts its emphasis on social contexts that exist beyond individuals' remit, whereas subjectivism emphasizes people's personal efficacy. At the same time, Giddens rejected positivism for his theory and opted for a hermeneutic approach (Bryant and Jary 2010).

At the heart of Giddens's theory of the social world are structures, or "rules and resources, organized as properties of social systems" (Giddens 1984, p. 25, see Table 1). Rules are either "generalizable procedures" such as customs and routines or "formulated rules" such as in sports (Giddens 1984, p. 17ff.). Resources are "transformative capacity generating commands" over either objects (allocative resources) or people (authoritative resources) (Giddens 1984, p. 33). In addition to these two types of structure, there are three dimensions of structure: signification, domination and legitimation. Domination draws on resources, whereas signification and legitimation draw on rules. When people interact with each other in the form of communication, power, or sanctions, they employ these three dimensions of structure through three modalities, respectively: interpretive schemes, facilities and norms. Thus, according to Giddens (1984, p. 177), structures do have a constraining effect on people as they are "limits upon the range of options open to [them]", but they also enable action. Structures further allow "the 'binding' of time-space in social systems", that is, the fact that social practices exist across time and space (Giddens 1984, p. 17). Giddens repeatedly stresses the importance of time-space relations for sociological theory and identifies a "distanctiation" of time and space in modernity brought about by technology (Giddens 1990).

In addition to structure, Structuration Theory incorporates agency as a core premise of the social world. For Giddens (1979, p. 56; 1984, p. 9), agency involves the notion that "the agent could have acted otherwise" and the "capability to make a difference". Giddens repeatedly emphasizes the importance of agency vis-à-vis the social context in explaining human affairs, rendering his theory a highly voluntaristic one (Sewell 1992). Part of this perceived efficacy stems from agents' knowledgeability, the assumption that agents have considerable knowledge of their social contexts and are able to reflect upon their interactions with these contexts.

Structure and agency form a symbiotic, mutually constitutive relationship known as the "duality of structure". When engaging in social practices, actors refer to structures (in the form of "memory traces", i.e. mentally) and (re-)produce them in the process, creating the "structuration cycle". Structure, as Giddens (1984, pp. 5, 64) puts it, enters "[...] simultaneously into the constitution of the agent and social practices, and exists in the generating moments of this constitution". Having no physical existence,

structures are “both medium and outcome of reproduction of practices”. In light of this duality, not only are actions constrained and enabled by structures; structures are produced and reproduced by these very actions. Thus, agency and structure are two sides of the same coin.

Structuration Theory has been applied by IS researchers primarily via two distinct approaches (Jones and Karsten 2008; Pozzebon and Pinsonneault 2005). The first, developed by Orlikowski (1992) and frequently referred to as Duality of Technology, translates Giddens's concepts of structure, agency and their duality into a technological context; Giddens himself paid little attention to technology in his writings on Structuration Theory. The second is Adaptive Structuration Theory, introduced by Poole and DeSanctis (1994), that also incorporates some fundamental structurational ideas vis-à-vis technology but unlike the Duality of Technology stream deviates from Giddens's theory in major aspects. These two streams will be explained in the following.

Duality of Technology

Orlikowski (1992) applied Giddens's notion of the duality of structure to technology. The result was what she called the “duality of technology”, which “[...] identifies prior views of technology as either objective force or as socially constructed product as a false dichotomy” (Orlikowski 1992, p. 406). Like structures, technology is a medium and an outcome of human action. Technology is hence essentially social and more than simply a material artifact. Furthermore, technology exhibits “interpretive flexibility”, that is, technology does not have static influence but its effects depend on users' attitudes and knowledge towards a given technology. In the organizational context, there is a “time-space discontinuity” since the people who design a technology are typically not the same who use it; in most cases, the designers and users do not even belong to the same organization. Beyond this design/use disconnect, Orlikowski (1992, p. 408) emphasizes that “[...] the structurational model of technology posits artifacts potentially modifiable throughout their existence”.

Technologies, however, are not structures themselves according to a later development of the theory by Orlikowski (2000). In line with Giddens's view of the instantiation and physical non-existence of structures, Orlikowski posits that technological structures are “emergent” in practice and not “embodied” by the technology artefact per se. This is what she calls the “practice lens”. Thus, “technologies in practice” have structuring effects through continuous interactions by human agents. These agents enact structures when using technologies that influence how they use these technologies. Orlikowski argues in favor of in-depth qualitative studies to understand how structurational processes work empirically in the specific context of interest.

Adaptive Structuration Theory

Adaptive Structuration Theory (AST) explores the social structures that are considered to be directly inscribed in technology and how users interact with them (DeSanctis and Poole 1994). These structures consist of two elements: the “structural features” of the technology and the “spirit of this feature set”. The structural features provide control and meaning and are thus equivalent to the dimensions domination and signification, respectively, as expounded by Giddens. The spirit is equivalent to the legitimation dimension and refers to the technology's “general intent with regard to values and goals”, as represented by its underlying design metaphor, its features and their presentation, its user interface and its provision of training as well as other help (DeSanctis and Poole 1994, p. 126). People draw upon the technology's structures through “appropriation”, equivalent to Giddens's modalities, that is enacted through “appropriation moves”, such as direct use or evaluation. The appropriation of a technology can be faithful or unfaithful (with reference to the designers' original intent) and can include different instrumental uses and attitudes.

AST differs from Giddens's and Orlikowski's accounts of Structuration Theory in two major ways. First, as shown above, AST posits that social structures are inscribed in technology itself rather than being emergent through human interaction. Second, AST features a positivist epistemology, including hypotheses that can be tested empirically through variance approaches. Therefore, AST as an IS-specific application of Structuration Theory is a pronounced departure from Giddens's original ideas. In fact, Poole and DeSanctis (2004) argue that further development of Structuration Theory in IS should jettison some of Giddens's core tenets.

Previous reviews have identified these streams and analyzed how and to what extent they have been received by the IS community at a general level (Jones and Karsten 2008; Pozzebon and Pinnsonneault 2005). However, there is no such analysis on the level of individual concepts that have been introduced by these streams. We argue that filling this gap will reveal more fine-grained insight into the use of Structuration Theory in IS.

	Concept	Definition/Description	Source	
Structuration Theory (Giddens)	Duality of Structure	"The duality of structure [...] relates to the fundamentally recursive character of social life, and expresses the mutual dependence of structure and agency."	Giddens 1979, p. 69	
	Agency	"Agency concerns events of which an individual is the perpetrator, in the sense that the individual could, at any given phase in a given sequence of conduct, have acted differently".	Giddens 1984, p.9	
	Structure	"Rules and resources, organized as properties of social systems."	Giddens 1979, p. 66	
	Dimensions	"The dimensions of the duality of structure are [signification, domination, legitimation]".	Giddens 1984, p. 29	
	Dimensions	Legitimation	"[...] systems of moral rules."	Giddens 1976, p. 130
		Signification	"[...] systems of semantic rules (or conventions)."	Giddens 1976, p. 130
		Domination	"[...] systems of resources."	Giddens 1976, p. 130
	Modalities	"What I call the 'modalities' of structuration serve to clarify the main dimensions of the duality of structure in interaction, relating the knowledgeable capacities of agents to structural features."	Giddens 1984, p. 28	
	Modalities	Interpretive Scheme	"'Interpretive schemes' are the modes of typification incorporated within actors' stocks of knowledge, applied reflexively in the sustaining of communication."; modality of the dimension <i>signification</i>	Giddens 1984, p. 29
		Facility	modality of the dimension <i>domination</i>	Giddens 1984, p. 29
Norm		modality of the dimension <i>legitimation</i>	Giddens 1984, p. 29	
Duality of Technology	Duality of Technology	"Technology is the product of human action, while it also assumes structural properties. That is, technology is physically constructed by actors working in a given social context, and technology is socially constructed by actors through the different meanings they attach to it and the various features they emphasize and use."	Orlikowski 1992, p. 406.	
	Practice lens	"This practice lens posits humans as constituting structures in their recurrent use of technology. Through their regularized engagement with a particular technology (and some or all of its inscribed properties) in particular ways in particular conditions, users repeatedly enact a set of rules and resources which structures their ongoing interactions with that technology."	Orlikowski 2000, p. 407.	
	Interpretive Flexibility	"[...] the degree to which users of a technology are engaged in its constitution (physically and/or socially) during development or use."	Orlikowski 1992, p. 409.	
	Time-Space Discontinuity	"With many types of technology the processes of development and use are often accomplished in different organizations. That is, many of the actions that <i>constitute</i> the technology are often separated in time and space from the actions that are <i>constituted</i> by the technology [...]."	Orlikowski 1992, p. 407.	

Adaptive Structuration Theory	Spirit	"Spirit is the general intent with regard to values and goals underlying a given set of structural features."	DeSanctis and Poole 1994, p. 126.
	Appropriation	"[...] the immediate, visible actions that evidence deeper structuration processes [...] of the technology."	DeSanctis and Poole 1994, p. 128.
	Appropriation move	"[...] [G]roups may choose to appropriate a given structural feature in different ways, invoking one or more of many possible <i>appropriation moves</i> . Given the availability of technology structures, groups may choose to: (a) directly use the structures; (b) relate the structures to other structures (such as structures in the task or environment); (c) constraint or interpret the structures as they are used; or (d) make judgments about the structures (such as to affirm or negate their usefulness)."	DeSanctis and Poole 1994, p. 129.
	Faithful and unfaithful appropriation	"Faithful appropriations are consistent with the spirit and structural feature design, whereas unfaithful appropriations are not."	DeSanctis and Poole 1994, p. 130.

Table 1. Definitions of key terms

Research Method

As a first step of our review, we conducted a systematic search for relevant articles. To this end, we employed the EBSCO Host Business Source Complete and the Association for Information Systems (AIS) database. We scanned the eight major IS journals and the proceedings of the three major conferences. We selected all the articles published in these outlets that feature the keyword “structuration” in their abstracts. Our search yielded 106 research papers in total (see Table 2). 67 and thus the majority of the papers are conference papers, 39 articles were published in journals.

Journal / Conference	First year of publication	Identified papers
Information Systems Research	1991	7
Journal of MIS	1991	8
American Conference on Information Systems	1998	18
European Conference on Information Systems	2000	20
International Conference on Information Systems	2000	29
Journal of Information Technology	2000	1
Journal of AIS	2003	6
Information Systems Journal	2007	6
Journal of Strategic Information Systems	2008	2
MIS Quarterly	2008	3
European Journal of Information Systems	2009	7
Total		106

Table 2. Number of identified papers per journal/conference

Next, we searched these 106 papers for the occurrence of the relevant concepts as posited by the three streams of Structuration Theory in IS (see Table 1). For each concept, we conducted an electronic search within the articles' running texts, figures and appendices but not abstracts, headlines and captions. We included both singular and plural forms (i.e. “structure” and “structures”). Further, we checked the use of the concepts in their context; for example, we only considered the concept *norm* when specifically used as

a modality as proposed by Giddens. If a concept was mentioned in a paper at least once, this paper would be marked in our data set as referencing the concept regardless of further mentions of the same concept in the same paper. For example, if the search for *legitimation* in a paper resulted in five hits, this paper was marked in the same way as a paper that yielded a single hit. In the subsequent analysis, we used Boolean operators to allocate concepts to different groups such as research streams or superordinate concepts; for instance, we included the operation “*legitimation OR signification OR domination*” to find out whether a given paper referenced any of the dimensions set forth by Giddens.

Findings

Table 3 summarizes the resulting data. For each concept, we list the percentage share of papers that mentioned this concept, relative to the total number of 106 analyzed papers (see Appendix). Given their fundamental role in all three streams, we included the concepts *structure*, *agency* and *duality of structure* separately.

We draw five major findings from the data. First, the basic concepts *structure* and *agency* are widely used. Almost every paper mentioned *structure* at least once. The concept *agency* occurs much less frequently, but still in close to every second paper. Overall, about 98% of the papers mention either *structure* or *agency* or both. The prevalence of *structure* is not surprising given their dominant role in the theory that Giddens named accordingly. However, the fact that only about half as many papers reference the similarly important concept *agency* is remarkable.

Second, concepts proposed by Giddens (50%) are most frequently mentioned. Concepts from AST follow close behind (48%), whereas only a quarter of the papers reference concepts from the Duality of Technology stream. The relatively low level of representation of this stream is notable in light of the much higher share of papers that mention of Giddens's concepts. After all, Duality of Technology is an application of Giddens's theory to IS that adheres closely to the original theory's concepts and principles. A sizeable number of authors decided to stick to Giddens's theory rather than to its technology-specific application. By contrast, AST as a less faithful development of Giddens's ideas has elicited much more reverberation in the IS community.

Research Stream	Occurrence	Concept	Occurrence		
Structure or Agency	98%	Structure	97%		
		Agency	45%		
Structuration Theory (Giddens 1984)	50%	Dimensions	38%	Legitimation	31%
			Signification	32%	
			Domination	34%	
		Modalities	40%	Interpretive Scheme	30%
				Facility	25%
				Norm	32%
Duality of Technology (Orlikowski 1992)	25%	Duality of Technology	18%		
		Interpretive Flexibility	8%		
		Time-space discontinuity	2%		
		Practical Lens	8%		
Adaptive Structuration Theory (DeSanctis and Poole 1994)	48%	Spirit	34%		
		Appropriation	39%		
		Appropriation move	18%		
		Faithful	24%		

Table 3. Occurrence of structural constructs (share of total number of papers)

Third, IS researchers reference concepts from each stream to very different degrees. The AST concept *appropriation* is mentioned frequently (39%) but the closely related concept *appropriation move* by less than half as many papers (18%). In the Duality of Technology stream there is an imbalance in occurrence between the eponymous concept *duality of technology* (18%) and *time-space discontinuity* (2%).

Giddens's constructs are referred to more evenly, with both the various dimensions and modalities being referenced by about 40% of the papers.

Fourth, an analysis of the occurrence of the concepts over time reveals a peak in the year 2010 (see Table 4). Before 2008, structurational constructs were referenced by less than ten papers every year. There is a dramatic upward surge from the year 2007 (5) to 2010 (22) that only decreases to pre-2008 levels in 2012. Jones and Karsten's (2008) widely received review paper is certainly in some part responsible for the massive rise of interest in Structuration Theory among IS researchers. However, given the much lower levels of papers mentioning one of the structurational concepts in 2012 and 2014, this wave of interest may have been restricted to a few years.

Research Stream	Year																								Total	
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013		2014
Structuration Theory	2	2	1	0	0	1	0	0	1	3	5	3	1	3	1	3	1	2	8	10	9	6	4	6	2	75
Duality of Technology	1	0	0	0	0	0	0	0	0	0	1	3	0	1	1	2	0	2	2	3	4	3	1	2	2	28
Adaptive Structuration Theory	2	2	2	1	1	0	1	0	0	1	1	1	3	4	1	4	0	1	7	7	9	5	2	4	2	62
Total	5	4	3	1	1	1	1	0	1	4	7	7	4	8	3	9	1	5	17	20	22	14	7	12	6	165

Table 4. Number of papers by stream, 1990-2014

Fifth, concepts from each of the three streams are frequently mentioned in combination with concepts from the two other streams (see Table 5). 34% of the papers combine concepts in this way. However, only about a tenth mentions concepts from all three streams. Conversely, a fifth solely references the fundamental concepts *structure* and *agency* but not any of the stream-specific concepts. Duality of Technology very rarely occurs on its own but almost always in combination with one or both of the other two research streams. AST is the stream that is most frequently referenced exclusively (25%). Given their diverging principles, there is little surprise in the fact that Duality of Technology and AST are least frequently combined.

	Giddens Structuration Theory	Duality of Technology	Adaptive Structuration Theory	Occurrence
Only Structure or Agency occur				20%
Exclusive occurrence	X			19%
		X		3%
			X	25%
Combined occurrence	X	X		10%
	X		X	11%
		X	X	3%
	X	X	X	9%

Table 5. Occurrence of concepts by research stream

Discussion

From the above findings we derive four major developments. In the following, we expose these trends and consider their implications for the further application of Structuration Theory in IS.

Agency: These two most fundamental concepts of Giddens's theory both enjoy frequent use, but in comparison *agency* plays a much less important role. Despite its name, Structuration Theory does not argue for *structure* to be superior to *agency* when it comes to explaining social relations. On the contrary, his proposed *duality of structure* implies that they are not only equally important in analysis but also inseparable in ontology. Therefore, the fact that many IS researchers have chosen to adopt the concept *structure* but not *agency* deserves explanation. One major reason for this imbalance is that AST

is primarily concerned with structures but less with agency. Consequently, in our data set, only about 40% of the papers that reference AST concepts also reference *agency*; for the papers that reference Giddens and/or Duality of Technology, the share is about 65%. In light of these numbers agency is certainly no blind spot in IS applications of Structuration Theory. But given the centrality of the *duality of structure* to this theory, the numbers show that IS researchers have perhaps not given agency as much as attention as is warranted. Jones (1999) explicitly points out that “[a]ttempts to use structuration with methods that ignore the irretrievably hermeneutic character of social science, with causal models, or with a focus solely on a single level of analysis (particularly where individual agency is excluded), are therefore at odds with central principles of the theory” (p. 131).

Maturing: Since Giddens proposed Structuration Theory more than three decades ago its IS-specific applications and developments have matured. Structural concepts have seen a rising use in the past ten years compared with the two previous decades. Relatively recent advancements like Strong Structuration Theory (Greenhalgh and Stones 2010) or new perspectives on AST (Markus and Silver 2008) demonstrate continuing interest in Structuration Theory. We encourage IS researchers to contribute to this productive tradition.

Flagship concepts: IS researchers frequently cherry-pick one or two concepts from each stream (with the exception of Giddens's original theory). As we have seen, this is most obviously the case in the stream Duality of Technology, where the eponymous concept *duality of technology* is mentioned much more often than the other concepts proposed by Orlikowski. In many cases, such cherry-picking presumably happens because authors find some concepts more useful than others. In other cases, however, authors might use crucial concepts such as *appropriation* as flagships. That is, they reference a key concept of a stream to showcase knowledge or even use of that stream's theoretical framework without taking into account the theory as a whole. In such an event, flagshipping might be inferior to the comprehensive acknowledgement of the theory. This is true for the very fundamentals of Structuration Theory. As shown above, a significant share (19%) of all the papers only mention *structure* and/or *agency* but not any of the more specific concepts proposed by the three streams. Referencing these two concepts might in some cases be sufficient for arguing that one employs a structural approach and particularly Giddens's theory. However, we agree with Jones and Karsten (2008) that Structuration Theory's more fine-grained concepts such as the dimensions and modalities could be more frequently applied in IS in addition to the basic concepts.

Piggybacking concepts: The fact that concepts are frequently combined within and across streams supports the notion that they become more useful through such cross-fertilization. In other words, authors have concepts "piggyback" each other. This finding suggests that IS researchers who employ structural approaches do not only profit from the increasing maturity of Structuration Theory in IS but also from the diversity of streams and concepts. Therefore, we argue that the branching-out of Structuration Theory into different streams, topics and applications is a strength rather than a weakness.

Conclusion

We provided a state-of-the-art picture of the use of Structuration Theory in IS by spotlighting individual theoretical concepts. Through our quantitative analysis of the occurrence of these concepts in major IS journals and conferences, we presented five major findings: agency has been living in the shadow of structure, Structuration Theory in IS has matured over the course of past decades, some structural concepts serve as flagships, and concepts are frequently piggybacked to enhance their use further.

There are, of course, several limits to this study. First, rather than including as many publishing outlets as possible, we based our analysis on the Senior Scholars' Basket of Journals (as defined by the Association for Information Systems) and the three major conferences. However, since we focused on the leading IS journals and conferences, we believe that broader coverage would yield similar findings. Second, we included the three major research streams of Structuration Theory in IS as identified by previous reviews. A more comprehensive analysis should incorporate further approaches and streams (e.g. Markus and Silver 2008; Stones 2005). Third, we focused on the essential theoretical constructs of each stream, but these streams feature further concepts whose analysis might provide further insight. Finally, we used a relatively rough quantitative method to present an overview of the degree to which structural

concepts are used in IS. Further research can use a more fine-grained quantitative approach or have an in-depth look at the contexts of use.

References

- Bryant, C. G. A., and Jary, D. (eds.) 2010. *Giddens' theory of structuration: A critical appreciation*, London: Routledge.
- Cohen, I. J. 1989. *Structuration theory: Anthony Giddens and the constitution of social life*, Houndmills, Basingstoke, Hampshire: Macmillan.
- Cousins, K. C., and Robey, D. 2005. "Human Agency in a Wireless World: Patterns of Technology Use in Nomadic Computing Environments," *Information and Organization* (15:2), pp. 151–180.
- DeSanctis, G., and Poole, M. S. 1994. "Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory," *Organization Science* (5:2), pp. 121–147.
- Giddens, A. 1976. *New Rules of sociological Method: A positive critique of interpretative sociologies*, New York: Basic Books.
- Giddens, A. 1979. *Central Problems in Social Theory: Action, Structure, and Contradiction in Social Analysis*, Berkeley: University of California Press.
- Giddens, A. 1981. *A contemporary Critique of historical Materialism*, Cambridge: Polity Press.
- Giddens, A. 1984. *The Constitution of Society: Outline of the Theory of Structuration*, Cambridge: Polity Press.
- Giddens, A. 1990. *The Consequences of Modernity*, Cambridge: Polity.
- Greenhalgh, T., and Stones, R. 2010. "Theorising big IT programmes in healthcare: Strong structuration theory meets actor-network theory," *Social Science & Medicine* (70).
- Heracleous, L., and Barrett, M. 2001. "Organizational Change as Discourse: Communicative Actions and Deep Structures in the Context of Information Technology Implementation," *The Academy of Management Journal* (44:4), pp. 755–778.
- Jones, M., and Karsten, H. 2008. "Giddens's Structuration Theory and Information Systems Research," *MIS Quarterly* (32:1).
- Jones, M. R. 1999. "Structuration Theory," in *Rethinking Management Information Systems*, W. L. Currie and B. Galliers (eds.), Oxford: Oxford University Press, pp. 103–135.
- Markus, M. L., and Silver, M. S. 2008. "A Foundation for the Study of IT Effects: A New Look at DeSanctis and Poole's Concepts of Structural Features and Spirit," *Journal of the Association for Information Systems* (9:10/11), pp. 609–632.
- Orlikowski, W. J. 1992. "The Duality of Technology: Rethinking the Concept of Technology in Organizations," *Organization Science* (3:3), pp. 398–427.
- Orlikowski, W. J. 2000. "Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations," *Organization Science* (11:4), pp. 404–428.
- Poole, M. S., and DeSanctis, G. 2004. "Structuration Theory in Information Systems Research: Methods and Controversies," in *The Handbook of Information Systems Research*, M. E. Whitman and A. B. Wozzczynski (eds.), Hershey, PA: Idea Group, pp. 206–249.
- Pozzebon, M., and Pinsonneault, A. 2005. "Challenges in Conducting Empirical Work Using Structuration Theory: Learning from IT Research," *Organization Studies* (26:9), pp. 1353–1376.
- Sewell, W. H. 1992. "A Theory of Structure: Duality, Agency, and Transformation," *American Journal of Sociology* (98:1), pp. 1–29.
- Stones, R. 2005. *Structuration Theory*, Houndmills: Palgrave Macmillan.
- Timbrell, G., Delaney, P., Chan, T., Yue, A., and Gable, G. 2005. "A Structurationist Review of Knowledge Management Theories," in *Proceedings of the 26th International Conference on Information Systems*, Las Vegas, Nevada.
- Veenstra, A. F. van, Melin, U., and Axelsson, K. 2014. "Theoretical and practical Implication from USE of Structuration Theory in Public Sector is Research," in *Proceedings of the 22nd European Conference on Information Systems*, Tel Aviv, Israel.

Appendix

Authors	Year	Publication	Structure or Agency	Structuration Theory	Agency	Structure	Dimension	Legitimation	Signification	Domination	Modalities	Interpretive Scheme	Facility	Norm	Duality of Technology Theory	Duality of Technology	Interpretive Flexibility	Time-space discontinuity	Practice Lens	Adaptive Structuration Theory	Spirit	Appropriation	Appropriation move	Faithful
DeSanctis et al.	1989	ICIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Walsham and Han	1990	ICIS	1	1	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	0	0	0
Orlikowski, Wanda	1991	ISR	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
DeSanctis et al.	1991	JMIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0
Sandoe and Olfman	1992	ICIS	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheeler and Mennecke	1992	ICIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
Goppat et al.	1992	JMIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1
Davidson	1993	ICIS	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Miranda and Bostrom	1993	JMIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1
Nagasundaram and Bostrom	1994	JMIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1
Robey	1995	ICIS	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wheeler and Valacich	1996	ISR	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Hocking	1998	AMCIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schultze et al.	1998	ICIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Naik et al.	1999	AMCIS	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Miranda and Bostrom	1999	JMIS	1	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	1
Higgins, Guy M. Jr.	2000	AMCIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pozzebon	2000	AMCIS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
Cushman et al.	2000	ECIS	1	1	0	1	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0
Gregor and Johnston	2000	ECIS	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hassall	2000	ECIS	1	1	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Hirt and Limayem	2000	ICIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Miller et al.	2000	ICIS	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
Askenäs and Westelius	2000	ICIS	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marginson et al.	2000	JIT	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flynn and Hussain	2001	ECIS	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Johnston	2001	ECIS	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pozzebon and Pinsonneault	2001	ECIS	1	1	1	1	1	0	0	1	1	1	0	1	1	1	0	0	1	0	0	0	0	0
Rose and Scheepers	2001	ECIS	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	
Chae	2001	ICIS	1	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
Haggerty and Golden	2002	ICIS	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0
Salisbury, Wm. David et al.	2002	ISR	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Reining und Bongsik	2002	JMIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0
Im and Raven	2003	ECIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Melin	2003	ECIS	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	0	0	0
Bhattacharjee and Harris	2003	ICIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Allport, Christopher	2003	ISR	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Sarker and Sahay	2003	JAIS	1	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
Flynn and Hussain	2004	ECIS	1	1	0	1	1	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0
Siregar and Tan	2004	ECIS	1	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	1	0	0
Becker and Cline	2005	AMCIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gupta and Bostrom	2005	AMCIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1
Sedera and Dey	2005	AMCIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1
Atkinson and Brooks	2005	ICIS	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0
Phang and Kankanhalli	2005	ICIS	1	1	1	1	1	1	1	1	0	0	0	0	1	1	0	0	0	1	0	1	0	0
Timbrell et al.	2005	ICIS	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	0	0	0	0	0	0	0
Staehr et al.	2006	ECIS	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Chu and Smithson	2007	ISJ	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	0
Silva	2007	ISJ	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Schmidt et al.	2008	AMCIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kirwan et al.	2008	ICIS	1	1	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	0
Bélangier	2008	ISJ	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DeSanctis et al.	2008	JAIS	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Markus and Silver	2008	JAIS	1	1	1	1	1	0	0	1	0	0	0	0	1	1	0	0	0	1	1	1	1	1
Niederman et al.	2008	JAIS	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1
Phang et al.	2008	JSIS	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	0	1	0	0
Jones and Karsten	2008	MISQ	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bess	2009	AMCIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Menchen-Trevino et al.	2009	AMCIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0
Cao et al.	2009	EJIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Payton and Kiwanuka-Tondo	2009	EJIS	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0

Zhang et al.	2009	ICIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hussain and Cornelius	2009	ISJ	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Gupta and Bostrom	2009	JAIS	1	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	1	1	1	1
Ning Nan and Johnston	2009	JAIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Bostrom et al.	2009	JMIS	1	1	1	1	1	1	1	1	0	0	0	1	0	1	0	0	1	1	1	0	1	0	1
Rai et al.	2009	JMIS	1	1	0	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Jones and Karsten	2009	MISQ	1	1	1	1	0	0	0	0	1	1	1	0	0	0	0	0	0	1	1	1	0	0	0
Iyami	2010	AMCIS	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Mohan et al.	2010	AMCIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0
Nyella and Mndeme Mathew	2010	AMCIS	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	0	0	0	0	1	1
Prifling	2010	AMCIS	1	1	1	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Rosenbaum	2010	AMCIS	1	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Ali	2010	ECIS	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
Kabana and Brown	2010	ECIS	1	1	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Naidoo and Leonard	2010	ECIS	1	1	1	1	0	0	0	0	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0
Hunter III	2010	EJIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rodon and Sese	2010	EJIS	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Thomas and Bostrom	2010	EJIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nai and Kim	2010	ICIS	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0
Boonstra	2010	ISJ	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0
Krogh and Haefliger	2010	JSIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thomas and Bostrom	2010	MISQ	1	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1
Grgecic und Rosenkranz	2011	ECIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0
Alotaibi and Kuk	2011	ICIS	1	1	1	1	0	0	0	0	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0
Ng et al.	2011	ICIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
Raeth et al.	2011	ICIS	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	1	1	0	1	0	1	0
Rosenkranz	2011	ICIS	1	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	1	1	1	1	1	1	0
Triche et al.	2011	ICIS	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Jie Mein Goh et al.	2011	ISR	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uppatumwichian	2012	AMCIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grgecic	2012	ECIS	1	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	1	1	0	0	0	0
Nasution and Dhillon	2012	ECIS	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0
Obal et al.	2012	ECIS	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chen and Brown	2012	ICIS	1	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Kaewkitipong et al.	2012	ICIS	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Engelbert and Graeml	2013	AMCIS	1	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	1	1	1	1	1	1	1
Rigoni	2013	AMCIS	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cao et al.	2013	EJIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Alotaibi and Kuk	2013	ICIS	1	1	1	1	0	0	0	0	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0
Comi et al.	2013	ICIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Gupta, Saurabh	2013	ISR	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1
van Veenstra et al.	2014	ECIS	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	0	1	0	1	0	1
Burleson et al.	2014	ICIS	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
Pozzebon et al.	2014	ISJ	1	1	1	1	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Tsohou et al.	2015	EJIS	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Total			104	53	48	103	40	33	34	36	42	32	26	34	27	19	8	2	8	51	36	41	19	25	
%			98	50	45	97	38	31	32	34	40	30	25	32	25	18	8	2	8	48	34	39	18	24	

Table 6: Overview of the occurrence of theory constructs in IS research