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Matthew L. Smith

*London School of Economics and Political Science, M.L.Smith1@lse.ac.uk*

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# **75F. Testable theory development for small-N studies: critical realism and middle-range theory**

Matthew L. Smith  
London School of Economics and Political Science  
M.L.Smith1@lse.ac.uk

## ***Abstract***

Theory testing within small-N research designs is generally considered problematic. Developments in the philosophy of social science have opened up new methodological possibilities through, among other things, a novel notion of contingent causality that allows for contextualized hypothesis generation, hypothesis testing and refinement, and generalization. This article looks to contribute to the literature by providing an example of critical realist (one such new development in the philosophy of social science) research on a small-N comparative case study that includes hypothesis testing. The article begins with the key ontological assumptions of critical realism and its relation to theory and explanation. Then, the paper presents an illustrative example of an e-government and trust comparative case study following these ontological assumptions. Given word length limitations, the focus of the example is on the nature and process of theory and hypothesis development, rather than the actually testing that occurred. Essential to developing testable hypotheses is the generation of tightly linked middle-range and case-specific theories that provide propositions that can be tested and refined. The link provides a pathway to feedback the concrete empirical data to the higher level (more abstract) and generalizable middle-range theories.

## ***Keywords***

Critical realism, case study, hypothesis testing, middle-range theory, trust, e-government

## **1. Introduction**

Theory-testing in small-N studies is generally considered problematic. Small-N studies refer to studies with a small number of observations where the goal is not to represent a relevant population, but rather is to conduct a more intensive study of a small number of phenomena (Gerring, 2007). From the positivist perspective, the small number of observations means that it is difficult to attain statistical significance. Consequently, researchers, especially qualitative researchers, have been advised in the past to increase the size of N as the best way to “enhance the inferential leverage of empirical tests” (Collier, Seawright, & Munch, 2004, p. 27). From the interpretivist epistemological perspective, research is not thought to be subject to the same evaluation criteria as positivist work (Klein & Myers, 1999; Weber, 2004) as the goal of research is to understand, not to discover (Orlikowski & Baroudi, 1991, p. 14) or test (Avgerou, Ciborra, & Land, 2004).

Consequently, a common occurrence in research is the use of post-hoc justification rather than theory-testing.<sup>1</sup> The inability to test theory means that the act of research takes on less importance than does justifying the results post-hoc (Morse, Barrett, Mayan, Olson, & Spiers, 2002). In such a situation, validity is no longer related to verification, but rather becomes a game of persuasion (Astley, 1985; Meckler & Baillie, 2003, p. 279). This situation places a strain on the validity of findings because there is so much flexibility the results in the confirmation an *a priori* stance that any interpretation can be found to fit the facts (Merton, 1967, p. 148).

There is a third perspective, underpinned by new developments in the philosophy of social science, which arguably provides for the possibility for a qualified theory-testing in small-N studies. Critical realism is a relatively new philosophy of the natural and social sciences developed in the late 70s and early eighties (Bhaskar, 1978, 1998b). Since then it has provided the basis for a range of social science research (Carter & New, 2004; Danermark, Ekstrom, Jokobsen, & Karlsson, 2003; Mingers, 2000, 2004d; Pawson & Tilley, 1997). This article argues that one of the benefits of this philosophy is that it contributes a novel notion of contingent causality that allows for contextualized hypothesis generation and hypothesis testing and refinement.<sup>2</sup> Furthermore, this approach allows for multi-level theorizing makes it possible for highly contextual empirical evidence to feedback to more abstract theories, a crucial step for generalization.

In the information systems literature, the potential benefits of critical realism have been touted (P. J. Dobson, 2002; Houston, 2001; Mingers, 2004a, 2004c, 2004d; Smith, 2006). However, there are few discussions of the influence of critical realist theorizing in information systems literature that move beyond stating that it allows for a broadly realist ontological position and supports multimethodology (e.g., Mingers, 2004c, 2004d). Furthermore, there are few examples of critical realism actively applied in research (P. Dobson, Myles, & Jackson, 2007; Morton, 2006). In particular, Dobson *et al.* argue that critical realism pushes for research that is tilted for theory confirmation or refutation. This article extends the Dobson *et al.* example to illustrate the role of theory, and in particular middle-range theory, in hypothesis formation and feedback to generalizable theory.

This paper provides an example of critical realist hypothesis generation taken from an in-depth case study of e-services and trust in Chile. The research involved employing both quantitative and qualitative methods to assess and understand citizens' interactions with and interpretations of the e-services in Chile. Even though the main method employed was the interview, the goal was not just understanding, but also explanation, hypothesis testing, and theory building.

The paper proceeds as follows. First, there is a consideration of the key ontological assumptions of critical realism and its relation to theory and explanation. Second, the paper

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<sup>1</sup> While such an approach is common for interpretivist studies it also occurs in positivist case study research (Dubé & Paré, 2003).

<sup>2</sup> It must be said that there are many other scientific realists who, while not explicitly critical realists, have come to almost the same conclusions on causality. For example, the philosophers Mario Bunge and Nancy Cartwright or methodologists like Shadish, Cook, and Campbell take similar positions on causality, as discussed below.

presents an illustrative example of a comparative case study following a critical realist philosophy. In order to show how critical realist assumptions influenced the research process, the illustration delves into the reasoning behind the process of middle-range and case-specific theory and hypothesis generation, and the method of theory integration. Finally, the paper concludes.

## **2. How does critical realism influence research?**

Mingers (2004b, 2004d) argues that critical realism “subsumes” positivism and interpretivism, effectively ending the paradigm wars. This statement can be understood when one views critical realism as an ontological project. The core of critical realism is a series of metaphysical ontological assumptions that emerged from an examination of scientific activity of what must be common to all things for research to be possible. It is through this new metaphysical framework that critical realism provides the common denominator upon which to integrate (and thereby subsume) research from within other research paradigms.

Integrating research effectively equates to a process of reinterpreting research in light of these critical realist ontological assumptions (Befani, 2005; Fleetwood, 2001; Pratschke, 2003; Ron, 2002). However, reinterpreting research *ex post* does not necessarily imply a change in the activity of research itself. Indeed, if we accept the critical realist position, then one might be tempted to argue that all research is by its very nature is critical realist without realizing it (Smith, 2006). If this is the case, then arguably critical realism does not appear to offer anything new to research practice, other than some new metaphysical concepts and jargon.

The influence of critical realism is that it provides a systematic approach to thinking about the relationship between research object and practice. Critical realism works at the level of metaphysics, and thus does not comment directly on the content of scientific level concepts or on what research strategies or methods to use (Bhaskar, 1978; Lawson, 2004; Martins, 2006). Rather, these assumptions provide a framework that underwrites causal-explanatory research and an emphasis on causal theory (Danermark et al., 2003, pp. 108-112). In other words, the ontological assumptions of critical realism have implications that pervade through to the practice of research, and, in particular, the relationship between theory and practice.

The central ontological assumption that influences research is the metaphysical and non-deterministic notion of the generative mechanism (Bhaskar, 2002; Groff, 2004, p. 138; Sayer, 2000). This notion is based upon a stratified reality that is broken up into three ontological domains: the real, actual, and empirical (Bhaskar, 1978, p. 13). The real consists of the “realm of objects, their structures and powers” (Kazi, 2003, p. 23). A structure consists of a set of relations that is held together by bonds of some sort (Bunge, 2004, p. 188). Emerging from these relations are the particular capacities to behave (causal powers) that are “nothing other than the way of acting of a thing” (Bhaskar, 1998a, p. 38). Thus, the internal relations that constitute the structure of a thing give it both its qualitative properties as well as its causal powers.

Causality and explanation are intimately related (Gregor, 2006, p. 618). Recently philosophers of science have begun to substitute talk about causality for scientific explanation (Cartwright, 2004). This follows for those subscribing to critical realism. Explanation is the uncovering of the operation and interaction of the influential generative mechanisms that brought about any particular outcome of interest. What makes this notion of causality especially powerful for explanation is that its metaphysical status enables it to encompass a wide variety of actual causes. For example, beliefs and desires can be causal (Archer, 1995; Meckler & Baillie, 2003, p. 275). This allows for the researchers who are interested in *understanding* to engage in hypothesis testing and refinement. Indeed, this idea is not necessarily new to interpretive work. For example, a strong argument can be made that the hermeneutic circle engages in theory testing of different interpretations (Follesdal, 1994; Martin, 1994). Critical realism also allows for attributing causes to the structures of social entities, stemming from a relational perspective on sociology (Porpora, 1998), which makes possible the tracing of the interaction of structure and agency through time (Archer, 1995; Volkoff, Strong, & Elmes, 2007).

This particular philosophical position creates a distinctive set of goals for theorization. First, one attempts to identify the distinctive core properties of the generative mechanism at work. These core properties are the essential components and their interrelationships from which the causal tendency emerges. Thus, a causal theory of a generative mechanism includes both the structural components and the outcome tendency. In this way, it is also possible to think about it in terms of a causal process. Central to this endeavor is that this is an ideal typical abstraction which means that a) it separates the necessary causally efficacious features from the nonessential ones (Shadish, Cook, & Campbell, 2002, p. 9), and b) the actual manifestations of these theories in the world will always diverge by some degree from the ideal.

Explanation, however, can move beyond simply revealing causal powers – it should also include in what circumstances they are active (Fay, 1994, p. 95). If this is the case, then explanation requires a contextual notion of causality. A deeper understanding of generative mechanisms includes the three components found in the formulation “*x causes y (in circumstances c)*” (Cartwright, 2003). Thus, explanation includes the structure that underlies the generative mechanisms (structure of X), the outcome that these mechanisms tend to produce (Y), and finally the elements of context that trigger or inhibit the firing of these generative mechanisms (C). Any explanation must include all three of these elements. The end result is that we are interested in, to paraphrase Carlsson (2003) and Pawson & Tilley (1997, p. 210), *how, for whom, and in what circumstances* particular mechanisms generate particular outcomes.

### **3. A critical realist comparative case study**

A comparative case study of the impacts of e-government on trust in Chile was conducted applying these critical realist ontological assumptions. This study began with a relatively simple assumption and research question. The assumption is that there is a causal link between e-government services and citizens’ trust in government institutions. The research question explores that link: *how, for whom, and in what circumstances do e-services impact on citizens’*

*trust in government?* Another way of framing the question is: *what are the generative mechanisms that connect e-services to changes in citizens' trust perceptions of government?*

The goal of presenting this case study is to demonstrate how middle-range and case-specific hypotheses can be used to develop testable contextualized theory. This testable theory was consequently employed in case study work with a concern for “understanding” citizens’ interpretations of their interactions with the e-services in terms of trust in the government. Given space constraints, the presentation is limited to the process of theory generation.<sup>3</sup>

The following discussion presents a picture of theorization that appears as if it were completed before the first foray into the field began. The reality is, of course, more complex. However, for considerations of space and simplicity, it is presented in linear order. Theorization as performed for this research was done in layers, from abstract ideal-typical theories to concrete. There are two main levels of theory: middle-range theories and case-specific testable hypotheses.

### **3.1 Developing middle-range hypotheses**

Building up the conceptual framework for e-government and trust requires three levels of theory integration where each level provides the structure upon which the subsequent level is constructed (see Figure 1). The first layer establishes a core theory of trust. This phase of the study identified several components of trust that were arguably essential for the concept: a distinction between trust and trustworthiness, the two dimensions of trustworthiness of motivation and competence, the notion of trustworthiness cues that communicate these dimensions, and finally that placing trust requires a cognitive and emotional component for the truster. The conceptualization directs the researcher to understand the components of institutional trust interaction: a) the objective characteristics of institutional trustworthiness, b) how trustworthy cues emanating from these characteristics are communicated through action (or non-action), and c) the perception and interpretation of these characteristics.

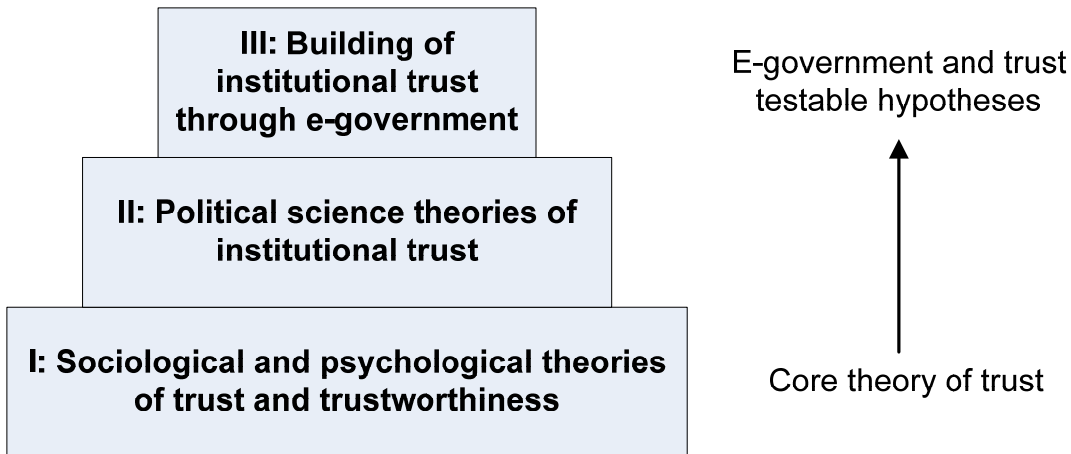
Building upon this trust foundation, the second level integrates political science theories of trust in government, and specifically, institutional trust. This level provides the framework of how this research will approach the question of what it means to trust in government (institutional trust), and if such trust is even possible. The third level is broken up into two parts. The first part provides a theoretical understanding of the dynamics of ICT in the public sector providing insight into the types of changes that can be expected with the introduction of e-government. Here is where the technological artifact enters into the causal equation. The second part of level three then integrates all of the theory and draws from empirical work to form the final sets of testable hypotheses that connect e-government to institutional trust.

The end result of this process in this study is a series of fifteen ideal-typical middle-range theories (see Table 1). Middle-range theories fall between high-level non-testable theory and concrete descriptions (Merton, 1967). These are theories that are close enough to the empirical world to be tested and refined. As we will see, they provide the link between the concrete

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<sup>3</sup> For those interested in the details of the full study, see Smith (2007).

findings of any particular research, and the middle-level theory upon which generalization is based. For critical realists, it is working at this level of theory where theory building can happen in a cumulative and more rigorous way (Danermark et al., 2003; Pawson & Tilley, 1997).



**Figure 1:** Levels of theory. The starting point for building theory is the general understandings of trust from sociology and psychology. This is followed by theories of institutional trust, generally drawn from political science. The final layer includes theories of building institutional trust through e-government, a very specific instantiation of institutional trust. The final stage of theory requires a detailed understanding of the interaction of ICT in the public sector. This is a movement from a core theory of trust to a specific instance of trust.

A quick note helps to explain the nature of the resultant hypotheses. The institutional trust theories provide a general perspective of the different ways we would expect the structure and activities of institutions to communicate trust to citizens that is theorized to build trust. This general theory is then decomposed into a variety of causal mechanism hypotheses that may or may not be active for any one e-service. Ideally, this decomposition also includes the relationship between these components that show how they interact to generate particular institutional trust outcomes. For example, good governmental performance has been linked to positive trust responses in survey work (Espinal, Hartlyn, & Kelley, 2006; Miller & Listhaug, 1999). Each individual component is then made more contextually applicable through a consideration of how the particular e-service (although still generally speaking) might impact institutional trust along the already identified dimensions. This requires the integration of institutional trust theory and an understanding of the interaction of ICT in the public sector. The ICT in the public sector theory provides the more specific hypothetical outcomes that fit within the more general institutional trust theory. Extending the performance example, we can then hypothesize that a more efficient service vis-à-vis computer automation is a specific example of institutional performance that will tend to build trust. It is important to note that given the relational nature of trust that these hypotheses are always relative to the truster. For example, good performance must be perceived by the truster in order for it to build trust.

Institutional trust theory	Examples of “Building institutional trust through E-services” hypotheses
<p><b>COMPETENCE</b></p> <p><b>Good institutional performance</b> that can be communicated, understood, and that is perceived to meet or exceed citizens’ expectations of performance tends to build trust.</p>	<p><b>Efficiency/effectiveness</b> E-services perceived to be more effective and efficient (faster, more accurate, cost savings) tend to build trust.</p> <p>E-government services that improve the efficiency and effectiveness of service at the institution’s physical office tend to build trust.</p> <p><b>Performance transparency</b> Performance transparency that meets citizens’ expectations tends to build trust.</p>
<p><b>MOTIVATION</b></p> <p><b>If the institution’s policies encompass the interests of the citizen, trust tends to be built.</b></p> <p>(1) <b>Mechanisms that work to align (such as voice and exit) the interests of the institution and citizen tend to build trust.</b></p> <p>(2) <b>Establishing credible institutional commitments through credible and effective institutional checks and balances that keep the public sector’s interests in line with citizens’ interests tends to build trust.</b></p>	<p><b>Considering users interests</b> <u>User benefits</u>: E-services that bring user benefits tend to increase trust. <u>E-service quality</u>: Good e-services quality indicates that the institution considers citizens’ interests and therefore tends to build trust.</p> <p><b>Transparency and accountability</b> <u>Institutional transparency and accountability</u>: Increased transparency made possible through the increased visibility of internal processes and service outcomes accompanied by perceived effective accountability mechanisms tend to build trust.</p> <p><b>Corruption</b> <u>Reduced corruption</u>: A reduction of corruption due to the computerization and rationalization of government processes tends to build trust.</p>

**Table 1:** Examples of the ideal-type, middle-range hypotheses developed from the theory. Only seven of the 15 testable middle-range hypotheses that were developed and tested are shown here.

### 3.2 Integrating theory: not one but many middle-range theories

The theorization so far was made following the assumption that (at least *a priori*) there is no single theory that will be sufficient to explain what may be happening in Chile with citizens, e-government services, and trust. Perhaps after engaging in research one theory will provide sufficient explanatory power through identification of a big-effect; that is, a large causal influence that overrides most of the other contextual causal mechanisms. Beforehand, however, it was not possible to know what the most influential causes might be. This means that theory was drawn from relevant sources that provide insight into the potential causal activities in particular aspects of the research object domain. For example, theories of ICT in public sector administration are helpful to understand how these implementations might alter the trustworthiness of the public sector institutions. However, these social-psychological or psychological theories are helpful when trying to understand citizens’ interpretations and resulting trust judgments of their interaction with the e-services. Furthermore, they need to be linked with the political theory that leads to an understanding of democracy and how citizens’



form judgments about the state. This integration of theory from across disciplines is made possible by working at the middle-range level and viewing each theory as contributing interesting causal components (George & Bennett, 2005).

The benefit of a focus on causality for theoretical integration is easily seen when considering trust theory. There is a vast literature on trust from a variety of disciplines that says a lot about the types of causal mechanisms that might connect e-services to citizens' perceptions, including theory from political science, sociology, psychology, information systems, and public administration. The research here exploits the current state of knowledge as a theoretical starting point and a means to generate an initial set of research orienting theories (for an overview of the objective of the research, areas of discipline, and theory used in this research, see Table 2). Integration is made possible through a reinterpretation of individual theories as generative mechanisms. For example, one area of contention in the trust literature is whether or not trust should be seen as a fundamentally rational concept, or one that is moral in nature. From the critical realist perspective, these conceptions are not competing. Rather, they represent theories that point to different causal components that may lead to trustworthy behavior (it is in my interest to do so *and* I think it is the honorable thing to do) and to trusting behavior (I think she will do it because it is in her interest *and* I think she is a virtuous person). If this is the case, the question becomes when and why these different motivators come into play. This approach is deeply rooted in the notion of a non-deterministic causality that always provides only a partial explanation as other co-active mechanisms are always active in a particular context. Not surprisingly, this meta-theoretical perspective emerges in other theory. For example, the Theory of Multiple Contingencies that "recognizes work unit design as being simultaneously influenced by numerous contingency forces, whose effects might complement or counteract one another" (Sambamurthy & Zmud, 1999, p. 268). Rather than a specific theory, so stated, the Theory of Multiple Contingencies can be interpreted as a metatheoretical position on causality that can be seen as roughly equivalent to the critical realist position.

### **3.3 Case-specific hypotheses**

The final stage of hypothesis generation is the development of case-specific testable hypotheses (see Table 3). This development of hypotheses is the last movement from abstract to concrete and always requires some knowledge of the actual case site. The specificity of the theory is analytically crucial as it allows the location of variation across cases. For example, consider a statistical analysis of survey results of people's trust in government after interacting with e-government web-pages, a common approach to studying e-government and trust. Such a study smoothes over the variations of the independent variables: the differences between the web-pages and individuals. It is these variations that are included in the context specific theories. It is at this level that we really get at the core of explanation; that is, the how, for whom, and in what circumstances e-government services will build institutional trust. The specificity of the theories also allows them to be subjected to within-case empirical testing.

Social object	Description of research area	Sources of theories
<b>Trust</b>	<ul style="list-style-type: none"> <li>• What is trust? What does it consist of? What are the outcomes of trust? How is trust built/destroyed?</li> </ul>	<b>Sociology</b> Hardin, Sztompka, Seligman, Luhmann, Giddens, Gambetta
	<ul style="list-style-type: none"> <li>• How do people interpret trustworthy cues, which cues do they pay attention to? How/why do people turn particular interpretations into trust judgments?</li> </ul>	<b>Social-psychology, psychology</b> Hardin, Braithwaite, Gambetta
<b>Trust in the state, institutional trust</b>	<ul style="list-style-type: none"> <li>• What constitutes a trustworthy public sector?</li> <li>• What types of experiences are important for a trustworthy state?</li> </ul>	<b>Political science</b> M. Levi, Harding, Cook, Warren, Norris, Zucker
<b>E-government (ICT in public administration, bureaucracy)</b>	<ul style="list-style-type: none"> <li>• Changes in public sector agency administration and services due to introduction of ICT</li> </ul>	<b>Information systems, organizational theory, public administration</b> Fountain, Kallinikos, Dunleavy, Heeks, Weber, Bhatnagar
<b>E-services and building trust in the state</b>	<ul style="list-style-type: none"> <li>• How do e-services influence institutional trust? What factors influence the perception and use of e-services?</li> </ul>	Empirical work: Moon, West, Tolbert & Mossberger, Avgerou <i>et al.</i>

**Table 2:** Social objects, research areas, and major theorists referred to in the development of the conceptual framework for thinking about the relationship between e-government and trust.

The concern with variation is essential because the case specific hypotheses will necessarily vary from the ideal-typical theory of which it is an instantiation. Understanding this deviation is necessary for judging the validity of the test for any one hypothesis. In other words, if we are going to test, say, if institutional transparency builds trust, it is necessary to establish the quality of the transparency in the case; we must first sufficiently establish the antecedents to know if it is a true test of the higher-level theory.<sup>4</sup> Knowing how the case specific instantiation varies from the ideal typical theory of transparency and trust building is crucial for making plausible inferences to deal with the inability to ever truly falsify theories. In other words, if transparency does not build trust in this specific case, is the higher level theory wrong or does the case deviate from the ideal-type theory? And how and why might the deviation alter the outcome? For example, imagine a web site that provides information of poor quality and timeliness. It would be a mistake to hypothesize that this web site would be trusted due to transparency. However, if it is found that the website does increase trust, if we can explain how and why we would have an interesting addition to the understanding of the relationship between web site transparency (information and quality) and trust.

In this study, each theory was first tested on a within-case basis. Each subject (e-service user) was considered an individual test of each theory. Do they trust? Why? What is it about this person that makes them trust (transparency, efficiency, something else)? Given the partial

<sup>4</sup> If we want to test or refine the theory “if A then B (in circumstances C)” we have to first establish A and C.

explanatory nature of each theory, during the analysis a concern is always maintained with the potential interactions between the causal components of the theory. After within case testing, theories were compared across cases, taking analytical advantage of the cases specific variations.

Middle-range institutional trust and e-services hypotheses	Case-specific e-tax trustworthiness-to-trust hypotheses
<b>Considering users interests</b>	
I1 <u>User benefits</u> : E-services that bring user benefits will tend to increase trust.	Increased user benefits in terms of time and cost savings for those who use the e-service will tend to build trust.
I2 <u>E-service quality</u> : Good e-service quality indicates that the institution considers citizens' interests and therefore tends to build trust.	High ease of use (completed tax proposal) and the usefulness of the e-service (a necessary obligation for taxpayers) indicates that the SII takes the citizen's interests into account and will tend to build trust.
<b>Transparency and accountability</b>	
I3 <u>Institutional transparency and accountability</u> : Increased transparency of internal processes and service outcomes accompanied by perceived effective accountability mechanisms will tend to build trust.	While the website presents the rules and regulations of tax processes as well as increases the transparency of the activities of the SII vis-à-vis the citizen, the lack of effective accountability mechanisms will tend to have no impact on trust.
<b>Corruption</b>	
I4 <u>Reduced corruption</u> : A perceived reduction of corruption due to the computerization and rationalization of government processes will tend to build trust.	Moderately decreased opportunities for SII employee corruption through the computerization of many tax processes will tend to have a moderate impact on building trust.

**Table 3:** Some examples of case-specific hypotheses developed from the e-tax system run by the SII (the Chilean tax authority). Each case-specific hypothesis is a contextually specific manifestation of a middle-range theory developed earlier.

It should be noted that, as it was employed in this study, case studies have the advantage especially in the exploratory stage of research to “allow one to test a multitude of hypotheses in a rough and ready way” (Gerring, 2007, p. 41). While such testing is potentially subject to errors of inference, if the focus is on the testing and refinement of the casual mechanisms and their contingent activation we have increased faith in their internal validity (Gerring, 2007; Tsoukas, 1989). The viability of a within-case analysis is enhanced by the use of within-case comparisons (George & Bennett, 2005), which in this case was between the e-service users. Finally, the use of the cross-case comparison adds extra analytical power to the testing and refinement of the theories (Eisenhardt, 1989).

## 4. Conclusion

The approach to theory development outlined in this paper provides some benefits. First, there is a tight link between different levels of theory. This provides a direct mechanism of feedback between the levels of theory allowing for the movement from case-specific empirical data to more generalizable statements. Thus, a within-case analysis can test and refine each of the different case-specific hypotheses separately. These refined theories can then provide feedback for the more abstract middle-range theories which are more portable than case-specific theories. The middle-range theories can be tested and refined in other research situations by creating other case-specific instantiations that correspond to the new empirical site. This allows for the flexible deployment of these theories in a variety of contexts, which also leads to the improved generalizability of these theories as they are made increasingly nuanced through the understanding of how they interact with different contextual mechanisms.

Of course, theory building does not always have to be done prior to research. The research approach taken here was heavy on front-end theorizing and used research cycles and comparative analysis to generate case-specific theories and then test and refine them. However, it would be perfectly consistent with the critical realist approach to generate theory using a method such as grounded theory if it was appropriate for the given research goals and subject. For example, Volkoff *et al.* (2007) conducted a longitudinal study of technology and organizational change using grounded theory underpinned by critical realism. The key is that the emerging theory should be of the causal-explanatory type discussed above.

All research has its problems as well. In particular, the approach proposed here is heavy on front-end theorizing and theory-integration. This requires extensive multi-disciplinary exposure. Undoubtedly, this adds significant richness to the theoretical propositions, and potential understanding when confronting the empirical site. It also helps to prevent social scientists from reinventing the wheel. However, there is a significant risk that a jack-of-all-trades is really a master of none. Furthermore, the result of theorization for the case presented here was a very broad set of potential causes (reality is complex!) on which the author tried to gather data. The end result was breadth rather than depth, and plenty of time was spent on particular causes that in the end were not of any importance.

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