5-2-2023

ON THE ROLE OF SMARTNESS IN HELPING CONSUMERS CREATE SUSTAINABLE OUTCOMES

Lars Andraschko
University of Augsburg, lars.andraschko@uni-a.de

Philipp Wunderlich
Reutlingen University, philipp.wunderlich@reutlingen-university.de

Saonee Sarker
Lund University, saonee.sarker@ics.lu.se

Daniel J. Veit
University of Augsburg, daniel.veit@uni-a.de

ON THE ROLE OF SMARTNESS IN HELPING CONSUMERS CREATE SUSTAINABLE OUTCOMES

Research in Progress

Lars Andraschko, University of Augsburg, Augsburg, Germany, lars.andraschko@uni-a.de

Philipp Wunderlich, Reutlingen University, Reutlingen, Germany, philipp.wunderlich@reutlingen-university.de

Saonee Sarker, Lund University, Lund, Sweden, saonee.sarker@ics.lu.se

Daniel J. Veit, University of Augsburg, Augsburg, Germany, daniel.veit@uni-a.de

Abstract

The proliferation of smart technologies transforms the way individual consumers perform tasks. Considerable research alludes that smart technologies are often related to domestic energy consumption. However, it remains unclear how such technologies transform tasks and thereby impact our planet. We explore the role of technological smartness in personal day-to-day tasks that help create a more sustainable future. In the absence of theory, but facing extensive changes in everyday life enabled by smart technologies, we draw on phenomenon-based theorizing (PBT) guidelines. As anchor, we refer to task endogeneity related to task-technology fit theory (TTF). As infusion, we employ theory on public goods. Our model proposes novel relations between the concepts of smart-autonomy and -transparency with sustainable task outcomes, mediated by task convenience and task significance. We discuss some implications, limitations, and future research opportunities.

Keywords: Smart Technology; Green IS; Public Good; Task-Technology Fit; Phenomenon-based Theorizing; Next Generation Theorizing.

1 Introduction

Theory on sustainable behaviors in private lives suggests that these are determined by attitudes, individual capabilities, contextual factors, personal habits, and household routines (Stern, 2000). Research on smart technologies and sustainability thus examined the effects of interventions to reduce household energy consumption (e.g., Loock et al., 2013) or antecedents to adopt respective technologies (e.g., Wunderlich et al., 2019). While we know why people use technology and that use can result in desired outcomes, the role between humans and machines in creating these outcomes remains theoretically elusive. In this vein, also recent calls emphasize the need to understand "how digital technologies can help individuals […] to measure what we should value […or] influence behaviors and decision-making of individuals" (Boh and Melville, 2022, p. 2).

There is a continuous emphasis on enhancing sustainability in private lives at home (e.g., Dubois et al., 2019). In fact, reducing emissions is imperative to every life domain, given that we are about to approach many irreversible ecological tipping points (Armstrong McKay et al., 2022). At the same time, the diffusion of smart technologies accelerates, especially among residents with the necessary purchasing power (McKinsey, 2021) – those with the largest share of emissions (Bao and Li, 2020). Industry research shows smart technologies can help to mitigate roughly five metric tons of one household´s energy-related emissions (Shwisberg et al., 2021). As long as a single refrigerator consumes more

electricity than a person in a "poor country" (The Economist, 2022), we believe focusing on decreasing the footprint of such households is essential to creating sustainable futures.

The proliferation of smart technologies in homes is changing how consumers perform household tasks. Compared to analog task execution, we observe that with the use of smart technologies, tasks like shopping for groceries, doing chores, or setting the temperature are completely transformed (e.g., Andraschko et al., 2021; Marikyan et al., 2019). However, this transformation has not yet received conceptual attention. Even though the link between technology, human behavior, and the quality of the environment was established early in Green IS at a high theoretical level (Elliot, 2011), there is still no model that makes the causal relationships between technology, transformed tasks and created sustainability impact tangible. Being aware that IS for sustainability has two sides of the same coin (e.g., Veit and Thatcher, 2023), we confine this paper to one side, that of supporting it. Our goal is thus to *examine the role of smartness in helping individual consumers create sustainable task outcomes.* More specifically, we seek to understand how smart technologies influence users' perceptions and as a result, their actions to mitigate climate change.

Phenomenon-based theorizing (PBT) is an emerging approach in response to an ever-changing world driven by evolving technologies (Fisher et al., 2021). In the absence of theory, but given far-reaching technology-enabled changes in daily lives, we follow the guidelines for PBT as they promise "fruitful opportunities to build theory" (Fisher et al., 2021, p. 638). In doing so, we draw on the task-technology fit (TTF) theory as a theoretical anchor and theory on public goods as injection.

Our work responds to calls for more purposeful sustainability research (e.g., Lehnhoff et al., 2021) and bolder integration of external theories to study IS phenomena (e.g., Burton-Jones et al., 2021). With this paper, we propose some preliminary thoughts about fundamental theoretical relationships. The relationships presented here should provide guidance for developing context-specific empirical studies. We believe that understanding the outlined potential for contradiction will help push the boundaries of smartness towards greater sustainability.

The remainder of this research-in-progress paper is structured as follows. After outlining the PBT methodology, we connect the phenomenon with extant conceptions and theories. Next, we propose the relationships between smartness and task outcome, mediated by task perceptions. Finally, we discuss some theoretical and practical implications - and limitations as well as future research opportunities.

2 The Phenomenon-based Theorizing Approach

This section provides background information on the nature of the study and the reasons for our methodological choice. Before emphasizing the differences between prior research on sustainability by/with IS (i.e., smart technologies) and our PBT approach, we clarify what we mean by theory and what guidelines we use for theorizing.

In essence, *theory* can be described as an account of some phenomena (Burton-Jones et al., 2015; Weber, 2003). PBT can thus be understood as the mode of inquiry, an approach that "entails the development of new theoretical insights and perspectives based on the observation of real-world phenomena" (Fisher et al., 2021, p. 632). While there is an extensive body of literature on theorizing (or theory-building), recently, scholars have called for more *interdisciplinary blending* (Rai, 2018), *novelty and boldness* (Burton-Jones et al., 2021), and *intellectual dwelling with the phenomenon* (Gregory and Henfridsson, 2021). Although the mainstream literature relies on inductive or deductive traditions, emerging theories within Management and IS research is bringing the phenomenon more and more into focus. For instance, Artificial Intelligence (AI) and network effects (Gregory et al., 2021), or personal data digitalization and human dignity (Leidner and Tona, 2021).

PBT deviates from the traditional dichotomy of theorizing modes (Fisher et al., 2021). Accordingly, it is neither a literature-based problem identification with reasoning for specific solutions (deduction) nor an unguided approach to data with the emergence of generic explanations (induction). It is closest to

abduction as it is about moving "from an unexplained anomaly toward a plausible explanation" (Fisher et al., 2021, p. 631). However, research surrounding phenomena of sustainability through/with IS has relied either on inductive or deductive traditions. As a result, theory has been tested or developed in the context of sustainability. For instance, experimental research has tested the impact of digital feedback (Tiefenbeck et al., 2018) or case study research has uncovered the digitally enabled environmental affordances (Tim et al., 2018). These two types of studies have in common that they lack the explanative power for phenomenological anomalies. That is why we utilize the PBT approach, seeking to uncover some extraordinary relationships when smartness helps consumers to create sustainable task outcomes. In other words, the lack of theoretical considerations drove our choice of a novel approach that puts the phenomenon at the center of inquiry.

The PBT guidelines suggest three steps to be followed: (1) Phenomenon identification, (2) connection with existing theory, and (3) advancing theory and perspectives to account for the phenomenon. While we have paved the way for the first step in the introduction, we will further outline the phenomenon in the following section. This is followed by connecting it to the foundations of two theoretical underpinnings. In the fourth section, we will then connect these underpinnings to the phenomenon under study through conceptualization. Staying true to the PBT approach (e.g., Fisher, 2019), we will develop theoretical propositions that aim to capture the fundamental underlying relationships.

3 Foundations for this Theorizing

3.1 Smartness, Smart Technologies, and Consumer Sustainability

We first turn to the higher-order concept of smartness to understand how smart technologies influence users' perceptions before examining how this influence can be related to climate change mitigation. There is a comprehensive definition of smartness (Alter, 2020, p. 384):

> *Purposefully designed entity X is smart to the extent to which it performs and controls functions that attempt to produce useful results through activities that apply automated capabilities and other physical, informational, technical, and intellectual resources for processing information, interpreting information, and/ or learning from information that may or may not be specified by its designers.*

Drawing on the definition above helps to conceptualize smart technologies (the purposefully designed entity) as a cause of impact. Smart technologies can thus enable actions in the real world. Consequently, these can also influence users and their actions, which is the focus of this work. In the remainder of the manuscript, we focus on smart technologies that require user interaction for actions in the real world (i.e., not pure "set and forget" devices).

One significant domain where consumers can mitigate greenhouse gases (GHG) and thereby create a more sustainable future refers to the "smart home and digitalization" (Creutzig et al. 2022). Therefore, we now turn to smart technologies in the home, which serve as a suitable class of technologies to examine the role of smartness in consumers' sustainable task outcomes. Such smart technologies enable the resident to stabilize the power grid (Watson et al., 2022; Wunderlich et al., 2019), or encourage the resident to conserve (Loock et al., 2013; Tiefenbeck et al., 2018). These also seek to enhance individuals' convenience, savings, or communication (…), including artifacts like smart -thermostats, -refrigerators, -speakers, etc. (Andraschko et al., 2021). Smart thermostats that enable the user to increase energy efficiency and provide grid stability are just one example of smartness transforming tasks toward sustainable outcomes (see, Shwisberg et al., 2021 for the full illustrative case). However, the relations between the smart technologies and its sustainability consequences, and how this relates to transformed everyday life tasks (e.g., heating, cooking, chores, etc.) has not yet been conceptually examined. This points to our theoretical anchor.

3.2 The Neglected Task-Endogeneity in TTF

The task-technology fit (TTF) theory "offers a theoretical mechanism for linking system and task-level phenomena to individual-[..]level outcomes" (Furneaux, 2012, p. 90). The TTF has proven as a powerful lens to predicting performance outcomes of individual- and group-level tasks serving private and organizational purposes (Goodhue, 1995; Goodhue and Thompson, 1995; Serrano and Karahanna, 2016; Zigurs and Buckland, 1998). Unlike individual-level theories explaining IS-acceptance, -resistance, or -success (cf. Dwivedi et al., 2012), the TTF offers a stronger (but parsimonious) basis for theorizing on the relation of technology´s impact on task-performance relations (Goodhue and Thompson, 1995). TTF is considered "almost undeniably a native IS theory" (Straub, 2012, p. xi). While this theory has advanced the adoption understanding, it has guided many examinations of antecedents for task-related outcomes (for a review, see Furneaux, 2012).

At its core, the theory states that technology- and task-characteristics are antecedents of performance outcomes (Goodhue, 1995; Goodhue and Thompson, 1995). While prior studies often referred to technological characteristics, we adopt the notion of capabilities "to capture the dynamic actions that each [the technology] is able to accomplish" (Serrano and Karahanna, 2016, p. 2). Because the task-outcome relation is of focal interest, including intermediate constructs (e.g., fit or utilization) is obsolete as these are naturally involved (Burton-Jones and Straub, 2006; Serrano and Karahanna, 2016).

Task endogeneity refers to situations when "the nature of a particular task can be fundamentally altered by the presence of technology" (Furneaux, 2012, p. 102). Prior work emphasizes the limited theoretical understanding of such situations (Furneaux, 2012; Vessey and Galletta, 1991). Thus, and given that we observe more and more technologies transforming tasks, a deeper reflection seemed a worthwhile endeavor. We believe that understanding the transformation of tasks through smartness appears to be of particular relevance as task characteristics are a crucial predictor for behavioral outcomes (e.g., Goodhue, 1995; Hackman, 1969). Given that the outcomes are to be sustainable, the following particularity must be considered, which alludes to the characteristics of the tasks: The "social welfare element" that is atypical for "contexts of IS use (e.g., for personal efficiency)" (Melville, 2010, p. 12). This prompts us to the theoretical injection.

3.3 Theory on Public Goods and IS Phenomena

To capture the core of the problem with the abovementioned "social welfare element," we draw on theory of public goods. Given that our climate is a global public good, with emissions being a negative externality or "public bad," activities that impact the climate crisis (accelerating or decelerating) are hardly captured by the market (Nordhaus, 2019). Thus, grid stability can also be deemed a kind of public good (e.g., De Castro and Dutra, 2013). This fundamental problem implies that individuals performing tasks that decelerate climate crisis (or are at least not free-riding) often refer to an act of voluntariness because the individual is not obliged to. While there are many nuances to explain individuals performing tasks contributing to public goods, two theoretical themes are outstanding: (1) Exchange and reciprocity (expecting something from others or benefits for the self) (e.g., Fehr and Schmidt, 2006) and (2) philanthropy and altruism (feeling better about a good deed) (e.g., Andreoni, 2006).

Extant literature[1] that investigates IS phenomena with public good characteristics, however, mainly examined adoption or information sharing (Hildebrandt et al., 2018; Sutanto et al., 2021; Trang et al., 2020; Wasko and Faraj, 2005; Wunderlich et al., 2019). Thus, the persistent focus on the reasons for public good contributions and the effects of respective designs (e.g., Jung et al., 2020; Trang et al., 2020) overshadowed the actual perception of the task and the impact of technology on the task (task

[1] Inferences ground on a literature review on public good related IS phenomena within the senior scholars´ basket of eight and well-known IS journals (fwd/ bwd search). From 41 papers, we selected 26 relevant individual-level empirical papers to extract 93 factors. Keywords were public good, common good, social good, pro-social, prosocial, pro-environmental, proenvironmental, voluntary contribution.

endogeneity). On top of that, there is a lack of evidence on IS-related task outcomes that refer to reciprocal *and* altruistic themes – at once. With the foundations of technology (smartness), task endogeneity (transformed by technology), and sustainable task outcomes (decelerating climate crisis), it is possible to delve into salient relations.

4 Tasks as Mediators for the Impact of Smartness

Table 1 provides a summary of the theoretical concepts under study. Although PBT does not draw on the traditional analysis of empirical data, one way to develop the conceptual idea relates to data complication (Fisher et al., 2021). That is, "some complicated, counterintuitive insight stemming from an existing data set" (Fisher et al., 2021, p. 635). Accordingly, the selection of our concepts was inspired by empirical, qualitative evidence gathered in another study to understand the relationship between smart technologies and sustainability. The important insight that manifested during data analysis was that convenience and significance could be opposites. That encouraged us to examine the relationship between two salient concepts more closely. First, users associated tasks with more convenience and simplicity when performed in support of smart technologies, which second tended to reduce the associated significance for sustainability when the desired behavior was conveniently by smart technologies. In moving from our “specific phenomenological observation to a theoretical explanation” (Fisher et al., 2021, p. 633), we develop a conceptual model based on the below-proposed relations derived from the literature.

Figure 1 shows our theoretical model. We begin with relationships that corroborate empirical evidence and require little explanation. We continue with the concretization of smartness. Then we establish the link to address the fundamental problem of task endogeneity. Although task-convenience and -significance might apply perhaps even in non-digital settings, one key assumption in the proposed relationships below is that smart technologies determine salient interactions. Finally, we examine these interactions - which, to the best of our knowledge, received no theoretical attention but are highly relevant when it comes to decelerating climate change.

Concept	Our Definition	Related Underpinning
Smart Autonomy	Technology independently performs and controls functions to produce useful action results	(Alter, 2020; Porter and Heppelmann, 2014)
Smart Transparency	Technology acquires and processes data to display valuable information on the action impact	(Alter, 2020; Porter and Heppelmann, 2014)
Task Convenience	Perception about the extent individual’s actions are facile in terms of time and effort	(Bailey and Pearson, 1983; Berry et al., 2002)
Task Significance	Perception about the extent individual’s actions provide opportunities to improve the welfare of others (i.e., our planet, future generations)	(Grant, 2008; Hackman and Oldham, 1976)
Sustainable Task Outcome	Environmental impact (positive or less-harmful) of private individual's (un-)intended actions	(Corbett, 2013; Stern, 2000)

Table 1. Preliminary Conceptualizations.

The topic of convenience has been for long a central construct in behavioral research (e.g., Bailey and Pearson, 1983). Repeatedly, it has been emphasized that more convenience leads to more desired outcomes. It is, therefore, unsurprising to assume that when someone perceives a task to be convenient, they are more likely to perform it. In fact, it is also an essential determinant when it comes to public good contributions (e.g., Brown et al., 2019). Recent studies show, for example, that a convenient design increases societally desirable behavioral outcomes such as information sharing for contact tracing (Trang et al., 2020). All in all, this implies the following.

Proposition 1: *Task convenience associated with the use of smart technologies positively influences task sustainability outcomes.*

Research suggests task significance as one of the key determinants for contributing to public goods, i.e., improving welfare (e.g., Hackman and Oldham, 1976). This is also quite unsurprising and reminiscent of self-efficacy research. Hence, if someone considers that their actions will affect the planet's health, then they are more likely to perform corresponding tasks. Research shows that when individuals anticipate good feelings from completing sustainable behaviors (van der Linden, 2018) or perceive technology as environmentally useful (Schill et al., 2019), they are more likely to act accordingly. It is also related to gaining "utility from the act of giving" (Andreoni, 1990, p. 473). Accordingly, such motives could also be observed in the use of sustainable technologies or crowdfunding (Bretschneider and Leimeister, 2017; Warkentin et al., 2017; Wunderlich et al., 2019). Taken together, it suggests our second relationship.

Proposition 2: *Task significance associated with the use of smart technologies positively influences task sustainability outcomes.*

Task endogeneity has received little theoretical attention as such (Furneaux, 2012). It is still not surprising that technology can change our perceptions of tasks. Nevertheless, it is necessary to examine the influences thoroughly. We thus draw on the capability orientation of smartness in propositions 3 and 4. As smart technologies combine "[m]onitoring, control, and optimization capabilities to achieve a previously unattainable level of autonomy" (Porter and Heppelmann, 2014), we assume some relief of an individual's time and effort. Hence, we suggest the following.

Proposition 3: *Smart autonomy positively influences task convenience.*

Research shows smart technologies that provide increased transparency through feedback on consumption goals or in real-time consumption (Loock et al., 2013; Tiefenbeck et al., 2018) have a real-life impact. While the behavioral causality has not yet been explicitly examined, it seems reasonable to assume that the task's significance will be increased through transparency. In this vein, security research suggests that individuals are more likely to contribute when they believe their behavior can make a difference (Anderson and Agarwal, 2010). In sum, we propose the following.

Proposition 4: *Smart transparency positively influences task significance.*

To understand the role of smartness in task sustainability outcomes, it is important to consider the possible interactions of the task perceptions under study. For this, we address some specificities related to individuals performing tasks for public goods. Research shows that when individuals contribute to welfare, they want to perceive that they are engaging in something. This is reflected in instances such as increased service satisfaction when they participate in recycling activities surrounding it (Giebelhausen et al., 2016), increased willingness to pay for green products when they were involved in the production process (Wei et al., 2018), or strong preference to donate time instead of an equal amount of money (Brown et al., 2019). If individuals do not invest time or effort in the task, they do not perceive it as a major contribution. In turn, it can be stated that if individuals perceive a task as highly impactful, it is also perceived more readily, possibly due to the feel-good effect (van der Linden, 2018). While we assume that extreme values of task significance or task convenience cannot be modeled straight, we note the interrelationships as tendencies (indicated with "can"). Finally, the following propositions result.

Proposition 5a: *Task convenience associated with smart autonomy can negatively influence task significance.*

Proposition 5b: *Task significance associated with smart transparency can positively influence task convenience.*

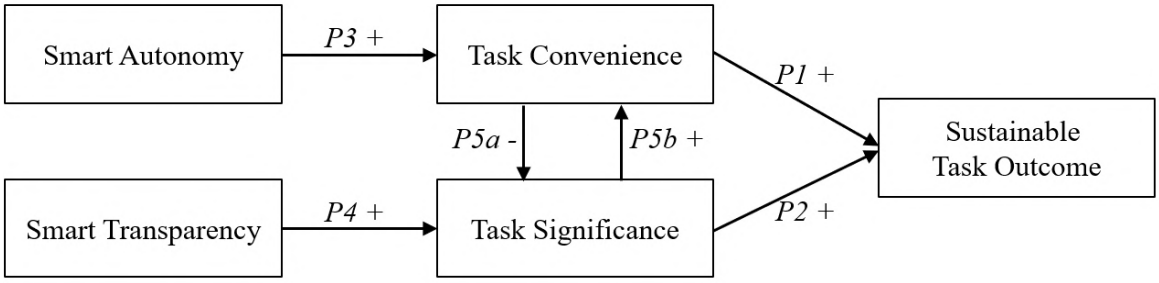

Figure 1. Preliminary Conceptual Model.

5 Discussion and Concluding Outlook

Given the considerable dormant potential for private consumers (Creutzig et al., 2022), understanding how proliferating smart technologies transform individual tasks to create more sustainable outcomes is imperative to justify and enhance their future use. With this research-in-progress paper, we seek to contribute to this understanding. In the following, we discuss some theoretical implications, limitations, practical implications, and future research opportunities.

First, this work represents an early empirical application of the novel PBT approach (Fisher et al., 2021). By departing from the traditional inductive–deductive dichotomy, we attempt to demonstrate the value of emphasizing the phenomenon. We thereby offer a conceptual explanatory model for phenomena we encounter in everyday lives and which previous studies have examined their effects (e.g., Tiefenbeck et al., 2018). Blending a native IS theory with a reference discipline theory also clearly responds to the call for next-generation theory (Burton-Jones et al., 2021).

Second, we seek to expand our understanding of TTF (Goodhue and Thompson, 1995; Zigurs and Buckland, 1998). Although one could argue that TTF is an old hat, previous theorists have problematically neglected the endogeneity of tasks. We believe this is important when technologies are becoming smarter and smarter while flowing into almost all areas of our lives (cf., Mousavi Baygi et al. 2021). The model set up here can help to deal with task endogeneity in a basic way.

Third, incorporating sustainability-related public good theory (Nordhaus 2019), we reveal the interrelations of technology-influenced task perceptions that have not been explored to the best of our knowledge. We reveal important connections of technology-influenced task perceptions that, to our knowledge, have not yet been explored. While it has already been shown in analog contexts that it is important to make consumers not too convenient to achieve sustainable task outcomes (Brown et al., 2019; Giebelhausen et al., 2016), this reflection is still absent in the digital realm. Thus, this theorizing makes an initial step for future research on responsible use and the potential opposing relation between convenience and significance.

This research-in-progress is not without limitations, which point to promising research opportunities. While we believe that applying the novel PBT approach certainly had its merits, assessing the rigor of such studies can be challenging. Future studies should thus asses the results of the theorizing endeavor with more established theory guidelines (e.g., Rivard, 2014). Given that this paper draws on data that has not primarily been collected for this paper, we cannot discard that other researchers would have come to slightly different or additional concepts as antecedents for the outcome under study. We have not formulated detailed hypotheses in this manuscript but deliberately remained with rather higher-level propositions (for the rationale see Section 2). However, we believe the model presented here can serve as a basis for formulating detailed hypotheses and testing theoretical relationships in specific contexts. Finally, we would like to emphasize that we have focused on the supporting side of the medal of IS for sustainability (see introduction). Future research can use the concepts and relationships proposed here to examine when smartness leads to negative task outcomes and even may cause increased consumption.

For practitioners, this paper also aims to create an early understanding that smart technologies will no longer be considered binary as sustainable or unsustainable. Thus, impact assessment should shift from centering the artifact toward a more user-centric assessment: What is the outcome of use and how design addresses both: Personal matters, such as relieving the individual's time and effort, and sustainability matters, such as its significance for mitigating GHG. Empirical studies are urgently needed to assess the salient relationships and boundaries of the impact mechanisms. Given our model's parsimonious nature, we anticipate it will be robust across multiple contexts. Besides some traditional IS use constructs, suitable control variables refer to eco-literacy, environmental concern, and demographics (Wei et al., 2018). After all, by arguing that smartness transforms tasks toward sustainability, we hope to contribute to understanding what is needed to create a more useful future for both the individual consumer and the planet, rather than serving one at the expense of the other.

Acknowledgments

We would like to thank the anonymous reviewers for their comments on earlier versions of this paper. Further, we thank the organizers and participants of the SIGGreen Workshop at the Forty-Third International Conference on Information Systems in Copenhagen for fruitful comments and discussions.

References

Alter, S. (2020). "Making Sense of Smartness in the Context of Smart Devices and Smart Systems." *Information Systems Frontiers*, 22 (2), 381–393.

Anderson, C., Agarwal, R. (2010). "Practicing Safe Computing: A Multimethod Empirical Examination of Home Computer User Security Behavioral Intentions." *MIS Quarterly*, 34 (3), 613–643.

Andraschko, L., Wunderlich, P., Veit, D. J., Sarker, S. (2021). "Towards a Taxonomy of Smart Home Technology: A Preliminary Understanding." In: *ICIS 2021 Proceedings*, Austin, TX.

Andreoni, J. (1990). "Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving." *The Economic Journal*, 100 (401), 464–477.

Andreoni, J. (2006). "Philanthropy." *Handbook of the economics of giving, altruism and reciprocity*, 2, 1201–1269.

Armstrong McKay, D. I. et al. (2022). "Exceeding 1.5°C global warming could trigger multiple climate tipping points." *Science*, 377 (6611, 7950 (eabn)).

Bailey, J. E., Pearson, S. W. (1983). "Development of a Tool for Measuring and Analyzing Computer User Satisfaction." *Management Science*, 29 (5), 530–545.

Bao, H. X. H., Li, S. H. (2020). "Housing wealth and residential energy consumption." *Energy Policy*, 143 (111581).

Berry, L. L., Seiders, K., Grewal, D. (2002). "Understanding Service Convenience." *Journal of Marketing*, 66 (3), 1–17.

Boh, W., Melville, N. (2022). "Digital Resilience for the Climate Crisis." *MIS Quarterly*, (Research Commentary).

Bretschneider, U., Leimeister, J. M. (2017). "Not just an ego-trip: Exploring backers' motivation for funding in incentive-based crowdfunding." *The Journal of Strategic Information Systems*, 26 (4), 246–260.

Brown, A. L., Meer, J., Williams, J. F. (2019). "Why Do People Volunteer? An Experimental Analysis of Preferences for Time Donations." *Management Science*, 65 (4), 1455–1468.

Burton-Jones, A., McLean, E. R., Monod, E. (2015). "Theoretical perspectives in IS research: from variance and process to conceptual latitude and conceptual fit." *European Journal of Information Systems*, 24 (6), 664–679.

Burton-Jones, A., Scott, S. V., Butler, B. S., Xu, S. X. (2021). "Next-Generation Information Systems Theorizing: A Call to Action." *MIS Quarterly*, 45 (1), 301–314.

Burton-Jones, A., Straub, D. (2006). "Reconceptualizing System Usage: An Approach and Empirical Test." *Information Systems Research*, 17 (3), 228–246.

Corbett, J. (2013). "Designing and Using Carbon Management Systems to Promote Ecologically Responsible Behaviors." *Journal of the Association for Information Systems*, 14 (7), 339–378.

Creutzig, F. et al. (2022). "Demand-side solutions to climate change mitigation consistent with high levels of well-being." *Nature Climate Change*, 12 (1), 36–46.

De Castro, L., Dutra, J. (2013). "Paying for the smart grid." *Energy Economics*, 40, 74–84.
Dubois, G. et al. (2019). "It starts at home? Climate policies targeting household consumption and behavioral decisions are key to low-carbon futures." *Energy Research & Social Science*, 52, 144–158.
Dwivedi, Y. K., Wade, M. R., Schneberger, S. L. (eds.) (2012). *Information Systems Theory*. Integrated Series in Information Systems, Springer New York, New York, NY.
Elliot, S. (2011). "Transdisciplinary Perspectives on Environmental Sustainability: A Resource Base and Framework for IT-Enabled Business Transformation." *MIS Quarterly*, 35 (1), 197–236.
Fehr, E., Schmidt, K. M. (2006). "The Economics of Fairness, Reciprocity and Altruism – Experimental Evidence and New Theories." In: *Handbook of the Economics of Giving, Altruism and Reciprocity*, Elsevier. pp. 615–691.
Fisher, G. (2019). "Online Communities and Firm Advantages." *Academy of Management Review*, 44 (2), 279–298.
Fisher, G., Mayer, K., Morris, S. (2021). "From the Editors: Phenomenon-Based Theorizing." *Academy of Management Review*, 46 (4), 631–639.
Furneaux, B. (2012). "Task-Technology Fit Theory: A Survey and Synopsis of the Literature." In: Dwivedi, Y.K., Wade, M.R., Schneberger, S.L. (Eds.), *Information Systems Theory*, Integrated Series in Information Systems. Springer New York, New York, NY. pp. 87–106.
Giebelhausen, M., Chun, H. H., Cronin, J. J., Hult, G. T. M. (2016). "Adjusting the Warm-Glow Thermostat: How Incentivizing Participation in Voluntary Green Programs Moderates Their Impact on Service Satisfaction." *Journal of Marketing*, 80 (4), 56–71.
Goodhue, D. L. (1995). "Understanding user evaluations of information systems." *Management Science*, 41 (12), 1827–1844.
Goodhue, D. L., Thompson, R. L. (1995). "Task-technology fit and individual performance." *MIS Quarterly*, 19 (2), 213–237.
Grant, A. M. (2008). "The significance of task significance: Job performance effects, relational mechanisms, and boundary conditions." *Journal of Applied Psychology*, 93 (1), 108–124.
Gregory, R. W., Henfridsson, O. (2021). "Bridging Art and Science: Phenomenon-Driven Theorizing." *Journal of the Association for Information Systems*, 22 (6), 1509–1523.
Gregory, R. W., Henfridsson, O., Kaganer, E., Kyriakou, H. (2021). "The Role of Artificial Intelligence and Data Network Effects for Creating User Value." *Academy of Management Review*, 46 (3), 534–551.
Hackman, J. R. (1969). "Toward understanding the role of tasks in behavioral research." *Acta Psychologica*, 31, 97–128.
Hackman, J. R., Oldham, G. R. (1976). "Motivation Through the Design of Work: Test of a Theory." *Organizational Behavior and Human Performance*, 16 (2), 250–279.
Hildebrandt, B., Hanelt, A., Firk, S. (2018). "Sharing Yet Caring: Mitigating Moral Hazard in Access-Based Consumption through IS-Enabled Value Co-Capturing with Consumers." *Business & Information Systems Engineering*, 60 (3), 227–241.
Jung, J., Bapna, R., Golden, J. M., Sun, T. (2020). "Words Matter! Toward a Prosocial Call-to-Action for Online Referral: Evidence from Two Field Experiments." *Information Systems Research*, 31 (1), 16–36.
Lehnhoff, S., Staudt, P., Watson, R. T. (2021). "Changing the Climate in Information Systems Research." *Business & Information Systems Engineering*, 63 (3), 219–222.
Leidner, D. E., Tona, O. (2021). "The CARE Theory of Dignity Amid Personal Data Digitalization." *MIS Quarterly*, 45 (1), 343–370.
Linden, S. van der (2018). "Warm glow is associated with low- but not high-cost sustainable behaviour." *Nature Sustainability*, 1 (1), 28–30.
Loock, C.-M., Staake, T., Thiesse, F. (2013). "Motivating Energy-Efficient Behavior with Green IS: An Investigation of Goal Setting and the Role of Defaults." *MIS Quarterly*, 37 (4), 1313–1332.
Marikyan, D., Papagiannidis, S., Alamanos, E. (2019). "A systematic review of the smart home literature: A user perspective." *Technological Forecasting and Social Change*, 138, 139–154.
McKinsey (2021). The Internet of Things: Catching up to an accelerating opportunity. URL: https://www.mckinsey.com/~/media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/iot%20value%20set%20to%20accelerate%20through%202030%20where%20and%20how%20to%20capture%20it/the-internet-of-things-catching-up-to-an-accelerating-opportunity-final.pdf.
Melville, N. P. (2010). "Information Systems Innovation for Environmental Sustainability." *MIS Quarterly*, 34 (1), 1–21.

Mousavi Baygi, R., Introna, L. D., Hultin, L. (2021). "Everything Flows: Studying Continuous Socio-Technological Transformation in a Fluid and Dynamic Digital World." *MIS Quarterly*, 45 (1), 423–452.

Nordhaus, W. (2019). "Climate Change: The Ultimate Challenge for Economics." *American Economic Review*, 109 (6), 1991–2014.

Porter, M. E., Heppelmann, J. E. (2014). How Smart, Connected Products Are Transforming Competition. *Harvard Business Review*, (November 2014). URL: https://hbr.org/2014/11/how-smart-connected-products-are-transforming-competition (visited on 9/20/2020).

Rai, A. (2018). "Editor's Comments: Beyond Outdated Labels: The Blending of IS Research Traditions." *MIS Quarterly*, 42 (1), ii–vi.

Rivard, S. (2014). "The Ions of Theory Construction." *MIS Quarterly*, 38 (2), iii–xiv.

Schill, M., Godefroit-Winkel, D., Diallo, M. F., Barbarossa, C. (2019). "Consumers' intentions to purchase smart home objects: Do environmental issues matter?" *Ecological Economics*, 161, 176–185.

Serrano, C., Karahanna, E. (2016). "The Compensatory Interaction Between User Capabilities and Technology Capabilities in Influencing Task Performance: An Empirical Assessment in Telemedicine Consultations." *MIS Quarterly*, 40 (3), 597–621.

Shwisberg, L., Dyson, M., Lillis, G., McEvoy, A., Creyts, J. (2021). Bringing Clean Energy Home: Unlocking Innovation and Policy to Align US Household Energy Use with Ambitious Climate Targets. URL: https://rmi.org/insight/bringing-clean-energy-home/.

Stern, P. C. (2000). "New Environmental Theories: Toward a Coherent Theory of Environmentally Significant Behavior." *Journal of Social Issues*, 56 (3), 407–424.

Straub (2012). "Editor's Comments: Does MIS Have Native Theories?" *MIS Quarterly*, 36 (2), iii–xii.

Sutanto, J., Wenninger, H., Duriana, H. (2021). "Warm-Glow Giving, Hedonism, and Their Influence on Muslim User Engagement on Loan-Based Crowdfunding Platforms." *Journal of the Association for Information Systems*, 22 (2), 353–382.

The Economist (2022). Africa will remain poor unless it uses more energy. URL: https://www.economist.com/middle-east-and-africa/2022/11/03/africa-will-remain-poor-unless-it-uses-more-energy (visited on 11/11/2022).

Tiefenbeck, V. et al. (2018). "Overcoming Salience Bias: How Real-Time Feedback Fosters Resource Conservation." *Management Science*, 64 (3), 1458–1476.

Tim, Y., Pan, S. L., Bahri, S., Fauzi, A. (2018). "Digitally enabled affordances for community-driven environmental movement in rural Malaysia." *Information Systems Journal*, 28 (1), 48–75.

Trang, S., Trenz, M., Weiger, W. H., Tarafdar, M., Cheung, C. M. K. (2020). "One app to trace them all? Examining app specifications for mass acceptance of contact-tracing apps." *European Journal of Information Systems*, 29 (4), 415–428.

Veit, D. J., Thatcher, J. B. (2023). "Digitalization as a Problem or Solution? Charting the Path for Research on Sustainable Information Systems." *Journal of Business Economics*.

Vessey, I., Galletta, D. (1991). "Cognitive Fit: An Empirical Study of Information Acquisition." *Information Systems Research*, 2 (1), 63–84.

Warkentin, M., Goel, S., Menard, P. (2017). "Shared Benefits and Information Privacy: What Determines Smart Meter Technology Adoption?" *Journal of the Association for Information Systems*, 18 (11), 758–786.

Wasko, M. M., Faraj, S. (2005). "Why Should I Share? Examining Social Capital and Knowledge Contribution in Electronic Networks of Practice." *MIS Quarterly*, 29 (1), 35–57.

Watson, R. T., Ketter, W., Recker, J., Seidel, S. (2022). "Sustainable Energy Transition: Intermittency Policy Based on Digital Mirror Actions." *Journal of the Association for Information Systems*, 23 (3), 631–638.

Weber, R. (2003). "Theoretically Speaking." *MIS Quarterly*, 27 (3), iii–xii.

Wei, S., Ang, T., Jancenelle, V. E. (2018). "Willingness to pay more for green products: The interplay of consumer characteristics and customer participation." *Journal of Retailing and Consumer Services*, 45, 230–238.

Wunderlich, P., Veit, D. J., Sarker, S. (2019). "Adoption of Sustainable Technologies: A Mixed-Methods Study of German Households." *MIS Quarterly*, 43 (2), 673–691.

Zigurs, I., Buckland, B. K. (1998). "A theory of task/technology fit and group support systems effectiveness." *MIS Quarterly*, 22 (3), 313–334.