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An institutional lens on smart product adoption

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Abstract: Smart products possess functional characteristics (e.g., autonomy, adaptability, reactivity, communicativeness) that sharply distinguish them from their non-smart counterparts. Consequently, they increasingly alter consumers' lifestyles and everyday practices. In this article, we examine why and how consumers adopt practices enabled by smart products, drawing on data from various actors and analyzing the influence of social context and interaction. We show that users perceive smart products as technological advancements that either substitute inefficient parts of existing practices or enhance these practices through congruent add-ons. We also demonstrate that users often acquire smart products to signal up-to-dateness, identity, and wealth. Reluctance to adopt new practices emerges in contexts where consumers attribute sacredness to elements of an existing practice. We propose a novel approach to characterizing adopter categories and conceptualize adoption as a transition period between mutually exclusive practices.

Keywords: Adoption, diffusion, smart products, adopter categories, institutional theory.

1 Introduction

Smart products have traditionally been defined through (1) technical characteristics, describing them as physical products with embedded information technology (e.g., Dhebar, 1996); (2) functional characteristics, describing them as performing various human processes, such as context-awareness, thinking, and reactivity (e.g., Rijsdijk and Hultink,

2009); or (3) outcomes, describing them as yielding improved simplicity and openness (e.g., Mühlhäuser, 2008). In essence, smart products are seen as ordinary products enhanced by technological innovation—typically through the incorporation of network technologies (e.g., Wi-Fi, Bluetooth) that enable communication with other smart products and users, sensors for data collection, and sufficient computing power for efficient data processing (Mayer et al., 2011).

The current wave of AI-powered smart products builds on this foundation but pushes it further. While earlier smart products were primarily characterized by connectivity and rule-based automation, AI-powered smart products increasingly employ machine learning, predictive analytics, and generative algorithms to infer preferences, anticipate needs, and autonomously adapt to users and contexts over time. Rather than merely executing pre-programmed routines, they co-evolve with users and their environments, often making decisions in opaque ways. This shift amplifies both the promises (e.g., personalization, anticipation of needs) and the perceived risks (e.g., surveillance, loss of control) associated with their adoption.

Research on smart products has long been dominated by a technological perspective, leading scholars to examine their adoption using frameworks popular for other technology-intensive products. These include Rogers' (2003) diffusion of innovation theory, the technology acceptance model (Davis, 1989), the theory of planned behavior (Ajzen, 1991), and the unified theory of acceptance and use of technology (Venkatesh et al., 2003). For example, adoption has been explained through perceived usefulness, perceived ease of use, and subjective norms within the technology acceptance model (Kim and Shin, 2015), and through performance expectancy, effort expectancy, social influence, and facilitating conditions within the unified theory of acceptance and use of technology (Mayer et al., 2011). Unsurprisingly, a common finding is that smart products are adopted because they offer higher performance and ease of use.

However, empirical evidence suggests that product smartness and AI capabilities are not unequivocally positive innovation attributes. Higher levels of smartness systematically increase perceived risk, while the generally positive effects on perceived relative advantage, compatibility, and complexity vary by smartness dimension and product category (Rijsdijk and Hultink, 2009; Kim et al., 2025). Customers often struggle to see the advantages of smart products and tend to judge them as intrusive (Mani and Chouk, 2017). As a result, many feel disempowered and reluctant to adopt smart products without the possibility of intervening directly in their functioning (Schweitzer and Van den Hende, 2016). Anxiety about AI even leads some consumers to prefer products framed as "smart" rather than "AI-powered," despite similar underlying technologies (Smale et al., 2024).

These challenges, combined with ethical issues that modern smart products raise—particularly around privacy, data security, and potential surveillance—indicate that they cannot be fully explained by traditional adoption frameworks (Kurtmollaiev, 2023). Although smart products often share category labels with their non-smart predecessors, and even with earlier smart products, their adoption does not simply involve buying a new artefact and using it in a familiar way. Instead, smart products typically require significant changes in established practices and often lead to the emergence of qualitatively new practices. A well-known example is Amazon Go, which offers a payment practice qualitatively different from traditional shopping. In such cases, adoption becomes less about purchasing new technological artefacts and more about embracing new practices

enabled by those artefacts, prompting calls for a practice-based view in adoption studies (e.g., Nysveen et al., 2020). This view is particularly salient for smart products, which, due to their learning capabilities and embeddedness in data ecosystems, actively reconfigure everyday ways of doing things.

In this article, we investigate the adoption of smart products by focusing on the practices they enable as the primary objects of adoption. By interviewing and observing various actors, and triangulating these data with secondary sources, we examine perceptions of smart products and their associated practices, as well as reasons for adopting or rejecting these practices. In analyzing our data, we apply institutional theory (e.g., North, 1990; DiMaggio and Powell, 1983) and the institutional logics perspective (e.g., Friedland and Alford, 1991; Thornton et al., 2012) to move beyond seminal adoption frameworks and to capture how social and institutional dynamics—including ethical concerns—shape adoption.

2 Institutional theory as a lens for studying smart product adoption

Although seminal adoption frameworks offer relatively simple explanatory models, their simplicity is also limiting. Being markedly individualistic in their focus on individual decision making, these theories emphasize rational choice with efficiency and effectiveness as universal rationales, while social factors (e.g., subjective norm, social influence) are reduced to individuals' perceptions of what others expect from them. Adopters' interpretations of innovation characteristics, their lived experiences with innovations, and the contexts in which these experiences are embedded remain largely unexplored. Previous studies also implicitly assume that adopters can provide invariant evaluations of an innovation across all usage situations, thereby ignoring context-based differences in perceptions. Moreover, prior research tends to treat specific products as the primary objects of adoption and diffusion, even though there is a growing understanding that individual products are only one type of resource that customers use to co-create value with other actors in a given context (Chandler and Vargo, 2011).

To overcome these limitations and accommodate recent advances and alternative insights on innovation and adoption (e.g., Vargo and Lusch, 2016; Nysveen et al., 2020), we apply institutional theory as our theoretical lens for studying innovation adoption, and more specifically, the adoption of new practices that smart products enable.

Institutional theory focuses on deeper social structures, or institutions, understood as the formal and informal rules and norms that govern the behavior of individuals and organizations (North, 1990). Institutions emerge, spread, and dissolve through mechanisms such as institutional entrepreneurship and institutional work, isomorphic pressures, and functional, political, and social pressures (DiMaggio and Powell, 1983; Thornton et al., 2012). Once established, institutions serve as sources of legitimacy for actors, prescribing what counts as appropriate or desirable behavior within a socially constructed system of norms, values, and beliefs. The enforcement and reinforcement of legitimacy—and of institutions more generally—may come from various legitimacy-granting authorities (individuals or organizations), the media, and society at large (Greenwood et al., 2017). Legitimacy also plays an important role in innovation diffusion, as embedding innovations

in legitimate and familiar designs increases the likelihood of successful adoption (Hargadon and Douglas, 2001).

Beyond defining legitimate behavior, institutions shape actors' identity, authority, focus of attention, and interpretations, which vary across domains of social life (Thornton et al., 2012). Within a particular domain (e.g., family, religion, corporations), institutions consolidate into sets of interdependent material practices and symbolic constructions, that is, institutional logics (Friedland and Alford, 1991). This means that, within a given institution, actors enact and elaborate symbolic constructions by regularly performing corresponding material practices. Institutional logics are not stable; they can replace one another, blend, segregate from a common origin, assimilate external elements, expand through internal elaboration, or contract in scope (Thornton et al., 2012). However, it remains relatively underexplored how the adoption of new practices enabled by smart products influences these institutional processes, and how existing institutions, in turn, shape adoption. We address this gap by investigating the interplay between new practices that smart products enable and established material practices and symbolic constructions.

3. Method

We collected data (also used in Kurtmollaiev, 2023) together with two research assistants in Norway, one of the most digitalized countries (according to the Digital Economy and Society Index by the European Commission), where smart and AI-powered technologies are increasingly used across social and economic spheres. The data collection proceeded in three phases. In the first phase, we gathered data from academic and professional experts to gain an initial understanding of various smart products, their functional and technical specifics, and their usage. These investigations took the form of semi-structured interviews and informal conversations addressing current consumer and technology trends, innovation and technology management, and consumer adoption of smart products. The second phase was a qualitative pre-study in which we conducted participant observations and interviews with customers to outline initial themes. We focused on understanding the underlying feelings and thought processes that actors have when evaluating and experiencing new practices enabled by smart products. To gain these insights, we conducted semi-structured interviews covering two topics: (1) perceptions and interpretations of smart products, and (2) distinctions between smart and non-smart products. In the third phase, which constituted the main study, we conducted the majority of semi-structured interviews, following the themes that emerged earlier. We focused on how practices and experiences change with the transition from non-smart to smart products and how various contexts influence the interpretation of practices enabled by smart products. The interview guide covered four topics: (1) distinctions between practices enabled by smart and non-smart products; (2) experiences with using smart products; (3) challenges and issues associated with smart product practices; and (4) the social context of smart product practices.

In total, we conducted interviews with 33 participants of different backgrounds, ages, and genders to ensure variation in cases. We also carried out several participant observations in electronics stores and respondents' homes, focusing on the behavior of buyers and users of smart products. In stores, we engaged in informal, unstructured conversations with employees and customers, asking about the variety, purpose, and perceived value of smart products. Finally, we complemented these data with secondary sources, including

newspaper articles, specialized journal pieces, reports from nonprofit organizations, and product manufacturers' advertisements for smart products.

4. Analysis

4.1. The adopters' perspective on product smartness

From the adopters' perspective, a product is smart if it leverages technology to advance existing practices. Although the general definition of technology as "a manner of accomplishing a task especially using technical processes, methods, or knowledge" (Merriam-Webster's Collegiate Dictionary, 2014) covers a broad spectrum of artefacts—from Stone Age tools to contemporary artificial intelligence algorithms—the understanding of "technology" is context- and time-contingent. Today, the term is primarily associated with digital information and electricity, reflecting the machines and devices that dominated the 20th and early 21st centuries.

In the context of smart products, technology is often understood as something that "is put in normal things" (respondent #21). Infusing traditional tangible products with digital components and computing hardware becomes the hallmark of product smartness. Because the use of technology is historically linked to increased productivity and progress, customers tend to assume that such infusion represents an "upgrade" or advancement.

Our data show that, from the adopter perspective, smartness typically manifests itself in either technological add-ons to existing practices or technological substitutions of specific parts of those practices. Technological add-ons are novel, technology-intensive elements that enhance traditional user practices without removing other components of an existing practice. Technological substitutions, by contrast, "smartify" practices by replacing manual or otherwise relatively inefficient parts of the existing routine. While technological add-ons are generally expected to be congruent with established practices, the success of technological substitutions depends largely on the extent of the efficiency gains they provide.

4.2. Gaining legitimacy and authority through the adoption of new practices

We found that, because smart products are closely associated with modern technology in customers' minds, using them has become a way to signal technological competence—a contemporary mode of feeling and expressing being "up-to-date." The glorification of technological competence is a hallmark of modern societies, with technological entrepreneurs such as Mark Zuckerberg and Elon Musk widely treated as global celebrities and extensively covered in mainstream media. Many contemporary films and series (e.g., The Social Network, Silicon Valley, Steve Jobs) depict central characters demonstrating their technological skills on computers or gadgets in front of awed audiences. The "geek" stereotype, previously portrayed as odd or marginal, is now often framed with admiration. Such scenes clearly parallel spectacles in which magicians or street performers showcase special skills to crowds trying to follow the "magic" unfolding before them.

Technological competence is also increasingly emphasized in governmental policies and job markets. In Norway, digitalization has become an integral part of governmental

strategies, and public agencies actively use and promote smart products (e.g., smartphones, smart grids, smart meters, smart safety devices) in their services. Under such institutional pressures, possessing—or at least demonstrating—technological competence becomes an important way of gaining legitimacy, which in turn stimulates the adoption of smart products.

The growing integration of smart technologies into economic life has created a strong demand for technologically competent workers. Where not formally enforced (e.g., delivery personnel using tracking and electronic signature devices), the adoption of smart products is encouraged through normative pressures. Because people typically define themselves and others, at least partly, in terms of profession and competence, it is reasonable to conclude that as technological competence becomes a source of legitimacy within modern social systems, it is also internalized and intrinsically valued, serving as a source of identity.

Finally, in our data, product smartness is consistently associated with higher expected price. “You pay extra for smartness,” as one respondent (#20) put it. Customers therefore tend to see smart products as inherently more valuable, in pecuniary terms, than non-smart products. Moreover, in cases where the use of smart products has completely replaced non-smart alternatives (e.g., smartphones), continuing with previous practices may negatively affect perceived wealth or status. Thus, early adoption of a new practice can serve as a signal of wealth and help in gaining authority, whereas once the new practice becomes established and institutionalized, its adoption becomes a necessity for preserving one’s authority.

4.3. Reluctance to adopt new practices

In certain contexts, established practices possess attributes that trigger reluctance to abandon them in favor of practices enabled by smart products. In our analysis, we identified four such attributes: evoking a sense of human sovereignty, empathy, identity-defining competence, and enjoyment. When attached to an established practice, these attributes become its sanctified elements, contributing to the practice’s perceived sacredness and hindering the adoption of new practices. In the case of smart products, this often manifests as resistance to technological substitutes that would allow the complete abandonment of human action.

Some of the most vivid expressions of resistance concerned contexts with high perceived risk, such as air travel. We find that practices seen as central to managing or bearing responsibility for the riskiness of a context are particularly likely to be preserved. This is grounded in a common belief that human intelligence surpasses any machine alternative, and that humans are therefore better equipped to solve problems and maintain control, especially in unexpected situations. For example, our respondents were extremely anxious about the idea of passenger planes operating fully autonomously. When reflecting on high-risk contexts, they generally considered smart technologies useful, but only if their role was limited to that of supportive tools under constant human supervision and control.

We also identified reluctance to adopt new practices based on technological substitutions in contexts with high emotional activation. In such contexts, actors are more inclined to resist practices that reduce or eliminate opportunities to experience and express empathy.

For example, although our respondents acknowledged that smart technologies might eventually perform most healthcare tasks better than humans and even outperform physicians in diagnosis, they remained strongly skeptical about receiving care from machines. This negative attitude toward substituting humans with machines in emotionally charged situations stems from a widespread belief that machines can never become truly emotionally intelligent and thus benevolent. Humans, by contrast, are seen as capable of expressing empathy and forming emotional connections, and are therefore attributed with the benevolence and kindness expected in domains such as healthcare and customer service. The prospect of delegating moral judgment to machines was another source of distress. Respondents partly explained this by the perceived wrongness of allowing artefacts to make life-and-death decisions, and partly by concerns that such delegation would make it difficult or impossible to ensure accountability for negative consequences. One reason for this lack of trust in machines in morally ambiguous situations appears to be a reluctance to accept the empathy-free logic underlying machine decision-making. Even if smart products were able to perfectly mimic human ethical decisions, they would still do so through complex calculations rather than empathy or natural inhibitions. In our respondents' eyes, this makes smart technology less trustworthy.

We also observed resistance to smart products in situations where interviewees perceived a threat to established practices that relied on identity-defining competence. Many respondents described initial hesitation—and often outright resistance—toward adopting new practices that offered easier solutions to tasks they took personal pride in performing themselves.

At the same time, all respondents mentioned tasks they were or would be happy to hand over to smart technology. Cleaning, cooking, dishwashing, trash collecting, bill payment, and even tying shoelaces were cited as examples. Although this is a diverse list, these practices share a common theme: they are experienced as chores. Interviewees were generally comfortable with, and often eager to relinquish, activities they regarded as necessary but fundamentally uninteresting. In contrast to their willingness to delegate activities perceived as chores, respondents were considerably more protective of practices they found inherently enjoyable, regardless of the outcome.

Our evidence thus suggests that actors tend to maintain practices they define as both gratifying (emotionally or cognitively) and central to their individual or collective identity. This implies a separation of practices into "unworthy" activities that can be substituted and "sacred" activities that warrant protection. In the context of smart products, the latter include practices that foster experiences of enjoyment, empathy, competence, and sovereignty (Figure 1).

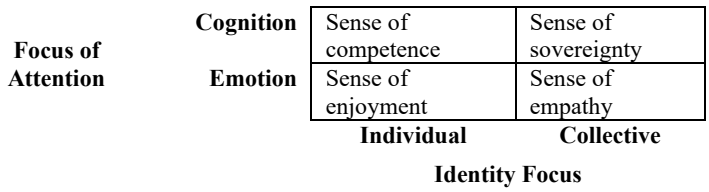

Figure 1 Sensemaking in maintaining established practices

4.4. The dynamics of adoption and adopter categories

Practices, together with symbolic constructions, are integral components of institutional logics (Friedland and Alford, 1991). Our results show that the development of new material practices (including the technologies and physical objects that enable them) both influences and is influenced by other elements of institutional logics. When a new material practice that is compatible with an established institutional logic emerges, it can substitute an existing practice. If it also introduces elements that require new symbolic constructions, it may become disruptive. For example, the smartphone was initially developed as a more effective and efficient substitute for mobile phones, but it also carried the potential to become a platform device due to burgeoning software opportunities.

Because practices unfold over time and time is limited, the adoption of new practices essentially occurs in two ways: (1) by substituting existing practices, and (2) by occupying time freed up when other practices become more efficient. When a new material practice is congruent with an established institutional logic and offers higher value than the corresponding existing practice (e.g., time savings or better experience), the likelihood of substitution is high, consistent with seminal adoption frameworks. According to our findings, an additional prerequisite is low internalization of the established practice. Successful adoption of a new practice then stimulates the development of further practices that are compatible with it (e.g., smart devices controlled via smartphones). Over time, however, these emerging practices may become increasingly incongruent with the original institutional logic (e.g., through extensive data collection and sharing) and instead require the expansion of new symbolic constructions. This process facilitates the emergence of a new institutional logic, but also challenges actors' self-concepts; their willingness to abandon the existing logic depends on how strongly they have internalized its elements.

The degree of internalization of existing practices and associated symbolic constructions thus becomes an important characteristic for differentiating between adopter categories (Table 1).

Table 1 The institutional logics perspective on adopter categories

Adopter category	Internalization of established material practices	Internalization of established symbolic constructions
Innovators	Low	Low
Early Adopters	Low	Medium
Early Majority	Medium	Medium
Late Majority	Medium	High
Laggards	High	High

Those actors who hold existing material practices in low regard or even view them as a burden become "innovators" when a new, relatively more attractive practice appears. They also readily abandon the established symbolic constructions that hinder the adoption of new material practices in favor of new symbolic constructions that are congruent with the new practices.

> *Things just become more and more useful, since they can do so many various tasks! I do not mind data sharing, whether it is through fridges, vacuum cleaners, or cars. Actually, I don't really think about the term 'smart products' anymore. They are just natural things now (Respondent #11).*

"Early adopters" are actors who do not value highly those established material practices that are to be substituted but, in contrast to innovators, are less eager to abandon the corresponding symbolic constructions. They accept new practices with little or no hesitation but tend to compartmentalize symbolic constructions or blend the existing and novel institutional elements together to solve the potential conflict between institutional logics:

> *I am comfortable with giving up control: when products become smarter, they cooperate more, and life becomes safer, easier, and more efficient. I would not mind giving up driving [to self-driving cars], as there are many other activities that I get enjoyment from. But I like cooking, and it would be sad if, in the future, I would never cook for myself because it would be done for me. (Respondent #20).*

"Early majority" and "late majority" include those people who are open to substituting some but not other parts of established material practices. Following innovators and early adopters, they may partially adopt new practices, especially if this offers opportunities for refocusing time and attention to those institutional elements that are more sacred to them. As early adopters, the early majority eventually accept some of new symbolic constructions, facilitating the formation of various hybrids between old and new institutional components:

> *Of course, I use some of smart things, because they become more and more usual now, but I am not particularly comfortable with using them too often. I feel that the more smart products we get, the less face-to-face contact with people we need. This worries me a bit. But I never think about it actively when I buy things. At that time, I just want to get that new cool thing (Respondent #21).*

In contrast, the late majority's strong attachment to established symbolic constructions results in their prolonged skepticism towards novel material practices and delays their adoption until practices have proved themselves and become widely accepted:

> *A robot vacuum cleaner makes your life easier, but I still have many doubts about the technology. What if it does not clean well? I know one person who has it and says it does not work that well. Actually, I do not need smart products, I don't feel it's a must for me. May be, when the technology gets better and becomes a standard… But I use my smartphone for everything! (Respondent #15)*

These groups are joined by younger generations, for whom the developed symbolic constructions and material practices are a norm since their birth, whereas previous cultural symbols and practices are merely historical curiosities. As Respondent #20 suggested, "When smart cooking becomes a norm and you get children who have never experienced cooking, they would not even bother doing it."

"Laggards" comprise those people, who have highly internalized the established material practices and the corresponding symbolic constructions. They are reluctant to adopt or even oppose other practices that bear elements of new institutional logics. The rest of society

may eventually force them into quitting old practices, leaving them with nostalgia for the partial loss of the self associated with the previous institutional elements:

> *I will never have a robot vacuum cleaner; it is creepy. I can neither think about switching on and off my oven through mobile phone – too spooky and dangerous. I do not like cars with automatic transmission either, I have a manual one that I control myself. …In schools, they use computers too much; in my opinion, it hinders children's creativity. My brothers' kids all have own iPads; my children would not have one. There are many social and creative benefits of doing things manually or in team. I do have a smartphone and a computer, but just because I have to (Respondent #18).*

> *Something was lost when online banking and washing machines came along. I have fond memories of washing clothes with my sisters, going to the bank, talking to people, getting to know them. (Respondent #8).*

According to our analysis, adopter categorization is practice-dependent, because the adoption of new practices is considerably determined by the attitude towards those existing practices that the new practices affect. In other words, the same people may be innovators in substituting those practices that they consider as a burden, but laggards with respect to practices which they internalized. In this sense, it is better to view adopter categories as institutional roles that emerge and change depending on the correspondence between new and established practices. Importantly, these roles are not isolated but belong to the social network that adopters constitute. The structural characteristics of this network (e.g., the number of innovators or laggards, their centrality, tie strength) shape the dynamics of adoption, especially its rate and extent (Muller and Peres, 2019).

4.5. Adoption as a transition period between established practices

From a historical perspective, there have been regular waves of substituting established practices with new ones that the development of technology (in a general sense of the term) enabled. The 20th century equivalent of "smart products" were "automatic products", which is evident from the pairwise comparison of the advertisements for automated and smart products with parallel functions (e.g., automatic dishwasher vs smart dishwasher, automatic toothbrush vs smart toothbrush, or automatic camera vs smart camera). Just as in the case of smart products, the value proposition of automatic products centered on the promise of increasing efficiency by technologically advancing the existing practices. For example, General Electric automatic dishwasher from 1950 offered savings of time, work, and water by being completely automatic and requiring "one simple control." As one of the main factors affecting adoption, this pursuit of efficiency creates a quantitative difference in effort and other resources that a given practice requires. Over time, as new practices become institutionalized, actors, especially from the younger generations, take the new standard of efficiency for granted and continue pursuit for even higher efficiency.

Because practices are stretched in time, and time is limited, the adoption of new practices essentially happens in two ways: 1) substituting existing practices and 2) occupying the time that was released due to other practices becoming more efficient. In this sense, adoption can be defined as a transition period between mutually exclusive practices. The

length of this period depends on the degree of sacredness of an existing practice and the degree of efficiency of a new practice.

5. Conclusion and practical implications

Seminal adoption models – such as the innovation diffusion theory, the technology acceptance model, the theory of planned behavior, and the unified theory of acceptance and use of technology – focus on the individual decision making. They explain customers' adoption decisions through isolated evaluations of specific new products along dimensions such as relative advantage, trialability, perceived usefulness, and ease of use. This approach leaves the interpretation of these terms to the individual and does not probe the underlying rationales behind product assessments. Moreover, although these models acknowledge the role of norms, they place limited emphasis on the extent and nature of social context in shaping adoption.

By conducting a qualitative, in-depth study of smart products and the practices they enable, we contribute to a richer understanding of innovation adoption. Adopting an institutional perspective, we show how institutional logics influence adoption decisions and how actors use the adoption of new practices to gain legitimacy and authority, as well as to preserve and enhance social identity. By explaining how certain practices or parts of practices become sacred, we clarify why actors resist adopting new practices even when these are more efficient than existing ones. Finally, by conceptualizing adoption as a transition period between mutually exclusive practices, we offer a new perspective that captures the cyclical manner in which practices are adopted and replaced.

In terms of practical implications, we argue that managers who focus solely on improving the characteristics of individual products within firm boundaries risk losing touch with a rapidly changing institutional reality. Instead of merely developing smart products in a conventional way, managers should carefully consider each product's role in the emerging smart ecosystem (Kurtmollaiev, 2023). They can also facilitate the diffusion of new smart products by helping customers reinvent, rework, and reconstruct their self-understanding in line with emerging institutional logics.

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