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Digital Bricolage and Its Limits: How Microenterprises Undertake Digitalization in Resource-Constrained Environments

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Abstract. Departing from traditional theory on digitalization, we argue that smaller enterprises in resource-constrained environments may take a different route to digitalization that is less strategic and more emergent, less engineered and more oriented to the situation at hand, and less driven by sophisticated technology and more likely to embody frugality. We ask, "How do microenterprises 'make do' their digitalization in resource-constrained environments?", addressing the question through a large-scale qualitative study in Ghana. The study comprises 69 interviews across microenterprises, government actors, and technology firms. Building on and complementing existing research on bricolage and digital value creation, our findings motivate a new theory of digital bricolage as distinct from entrepreneurial and IT bricolage. We identify three digitalization pathways: parallel bricolage, selective bricolage, and digital planning. Together, these capture a spectrum from an emergent, resource-constrained (parallel and selective digital bricolage) approach to a more strategic, planned (digital planning) approach to digitalization. Our findings challenge the assumption that digital resources inherently enable limitless recombination and boundless value creation. They show that digitalization through digital bricolage can have both enabling and limiting impacts. Whereas digital bricolage fosters microenterprises' short-term innovation, survival, and adaptations to resource constraints, overreliance on this digitalization path can paradoxically constrain long-term value creation because of limited functionality, integration issues, and reliance on the bricoleur's personal capabilities. This leads to a *digital bricolage trap*, where accumulated compromises lock enterprises into fragmented, low-capability digital states. We offer an alternative perspective to traditional digitalization theory, which assumes access to mature digital infrastructures, advanced technologies, and straightforward value generation. Our findings better account for the digitalization of smaller enterprises as a process of customizing affordable digital tools in ways that reflect local creativity and constraints.

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1. Introduction

Digitalization, understood as the pursuit of organizational goals through the utilization of digital technologies, offers a pathway for value creation for many organizations (Baiyere et al. 2023, Etienne Fabian et al. 2023). In information systems (IS) research, most theory on digitalization is grounded in a rational economic perspective. In this view, organizations strategically exploit an opportunity by seeking resources in a planned way, developing capabilities, and enacting digital technology to support current goals and future opportunities (Bharadwaj et al. 2013, Kane 2015, Canhoto et al. 2021, Soluk and Kammerlander 2021). Although rational and economically driven theories are helpful to describe the logic and process of digitalization, they offer only partial insights into the emergent and highly situated approaches of firms that, by necessity, exploit the local context and make do with whatever resources are at hand. Taking a more dynamic view, some scholars have highlighted emergent and improvised practices (Hartl

and Hess 2019, Oborn et al. 2019, Senyo et al. 2022). Following this stream of research, we argue that smaller enterprises, especially those in resource-constrained environments, may take a different route to digitalization, one that is less strategic and more emergent, less engineered and more attuned to the situation at hand, and less driven by sophisticated technology and more by frugality or doing more with less.

Despite constituting about 90% of organizations globally (World Bank 2021), smaller enterprises have been insufficiently theorized in IS research, leading to a significant gap in our understanding of how these enterprises digitalize (Etienne Fabian et al. 2023). The literature does, however, document the resource-constrained environments in which smaller enterprises operate (Baker and Nelson 2005, Senyard et al. 2014) and the pressure they face to digitalize (Rogers 2016). In developing countries, these challenges are magnified by high start-up and operating costs, prohibitive regulatory requirements, lack of access to formal financial instruments and infrastructure, challenges transacting in cash, and obstacles to adopting new technology (Li et al. 2018, Gomes 2023, Senyo et al. 2023). For microenterprises in such countries, the challenges are considerably magnified. These diverse enterprises include street and market vendors, smallholder farmers, petty retailers, and auto mechanics, all with personal histories of market exchange and ongoing reciprocal relationships through which they trade goods, favors, and services (Dolan 2012, Slavova and Karanasios 2018). They are characterized by a high degree of informality: generally, owners alone makes all the business decisions, with the enterprise being a vital source of income for them (Gomes 2023). Often operating outside traditional market mechanisms, many are unregistered and do not pay direct taxes (Senyo et al. 2023). As a result, they are unable to access government support mechanisms or traditional banking loans and services (Dolan 2012, World Bank 2021, Gomes 2023) and often have limited technical knowledge and skills (Andrade-Rojas et al. 2024). Because of these uncertainties and resource constraints, most of their decisions and actions are taken according to the change of tide as they negotiate fast-changing, complex, unpredictable, and turbulent environments (da Silva et al. 2023, Gomes 2023). Value creation paths for digitalization that typically follow planned and optimized digital resources building on advanced digital infrastructure (Hanseth and Lyytinen 2010, Piccoli et al. 2022) might not be available under such circumstances.

To bridge the explanatory gap in IS literature, we argue for a theoretical turn that embraces the different routes these enterprises may take to digitalization. Such a theory would offer an alternative way for IS scholars to interpret, explain, and account for unconventional digitalization and value creation paths. It would better reflect the nonlinear and varied paths that many microenterprises take in digitalization, contrasting with the more linear, rational, and economically focused explanations currently prevalent in IS literature. To develop this approach, we turned to the theory of bricolage developed in entrepreneurship research (Baker and Nelson 2005, Duymedjian and Rüling 2010) and to a lesser extent in IS research (Ciborra and Lanzara 1990, Lanzara 1999, Zorina 2021) and the literature on digital value creation (Yoo et al. 2010, Henfridsson et al. 2018). Defined as "making do by applying combinations of resources at hand to new problems and opportunities" (Baker and Nelson 2005, p. 333), bricolage encompasses both an enterprise's internal resources and the external resources available to it cheaply or for free (Senyard et al. 2014). With this in mind, we address the research question:

> *How do microenterprises "make do" with their digitalization in resource-constrained environments?*

We undertook a large-scale qualitative study in Ghana, comprising 69 interviews conducted across microenterprises, government actors, and technology firms. Based on our findings, we advance a theory of digitalizing with bricolage, making a number of contributions. First, we show that digitalization of smaller enterprises in resource-constrained environments follows an emergent trajectory that is shaped by local specificities and constraints (Oborn et al. 2019), rather than a deliberate strategy that leans toward expensive and complex digital technology. Connecting with recent research on alternative and emergent technology use in resource-limited settings (Oborn et al. 2019, Zorina 2021), we propose the concept of digital bricolage as an important pathway for microenterprise digitalization, one that allows them to make do with affordable and familiar digital technologies and animate creative digitalization despite deficiencies in resources and government support and infrastructure voids. For many enterprises, we argue, digital bricolage is the sine qua non of their digitalization, enabling them to operate between survival and growth, the informal and formal sectors, and between doing more with less and striving to do better with more. Our study shows such day-to-day bricolage practices result in enterprise digitalization (though scaled down and limited), just as other studies show enterprises pursuing digitalization through strategically oriented approaches (Li et al. 2018, Soluk and Kammerlander 2021). We use the study to develop a model of bricolage-enabled digitalization and subsequent propositions that offer insights into the pathways and impacts of digital bricolage.

Second, our insights complement and further advance the theory of enterprise value creation. Studies of bricolage and enterprise value creation portray innovators as those who reject environmental constraints by making

do with the resources at hand (Baker and Nelson 2005). We show that this may also involve tapping into the generative potential and unique properties of digital resources in ways that enhance enterprise value creation and growth (Yoo et al. 2010, Henfridsson et al. 2018) and address environmental constraints.

Third, our study reveals the dual nature of digital bricolage: it serves as both a lifeline and a potential "digital bricolage trap." The latter results in an inverted recombinability of digital technology: making do with digital technology helps microenterprises address immediate resource constraints, yet it also undermines the combinatorial and value creation potential of digital technology because of accumulated compromises and the incompatibilities between suboptimal solutions. Our work speaks to the boundary conditions of effective digital bricolage. It supports recent theorizing on the complexity of digitalization (Li et al. 2023) and its dual nature in creating and inhibiting value creation (Scott and Orlikowski 2022). Finally, we advance a theory of digital bricolage, delineating it in relation to both entrepreneurial bricolage and IT bricolage, and identify avenues for further research.

2. Theoretical Background

2.1. Motivating a Theoretical Turn

Most IS research theorizes digitalization as a strategic imperative. It focuses on alignment of IT resources with strategy (Soluk and Kammerlander 2021, Etienne Fabian et al. 2023, Li et al. 2023) while emphasizing the strategic development of digital capabilities (Canhoto et al. 2021, Soluk and Kammerlander 2021) and the use of advanced technologies such as platforms and data analytics (Piccoli et al. 2022, Baiyere et al. 2023). Such theoretical orientations are relevant to large, complex organizations that have planned strategies for developing and reconfiguring digital resources to maintain competitive advantage or to smaller digital ventures and high-growth start-ups that draw on advanced and optimal digital technology to scale at pace (Du and Mao 2018, Chan et al. 2020, Piccoli et al. 2022, Weber et al. 2022). Primarily conducted in the United States and Europe, this research also demonstrates how entrepreneurs are able to take advantage of established markets and benefit from favorable government policies and regulatory frameworks and have access to advanced digital infrastructure (Lanzolla et al. 2021, Piccoli et al. 2022). As such, the bulk of IS research is more aligned with entrepreneurship as innovation and risk taking, whereby entrepreneurs typically seek to disrupt markets through digital innovation and aim for significant growth.

This model of entrepreneurship is inconsistent with the reality in developing countries for both individual entrepreneurial endeavors and smaller enterprises. These actors do not aim to disrupt markets; instead, they are generally satisfied with steady and sustainable operations or the pursuit of more modest growth (Nason and Bothello 2023). On a related note, existing digitalization research has largely assumed unproblematic access to digital technology and the resources needed to support it (Steininger et al. 2022), neglecting institutional voids and the unpredictability that smaller enterprises face in the developing world (Walsham and Sahay 2006, Chipidza and Leidner 2019, Gomes 2023). While acknowledging the narrowing yet significant digital infrastructure divide, disparities persist in the outcomes of digital technology use. These are the result of institutional voids, including challenges in accessing formal banking instruments and obtaining capital, lower social status, and difficulties in accessing government assistance (Gomes 2023, Nason and Bothello 2023). These voids extend to restrictions on digital infrastructure (Hanseth and Lyytinen 2010) from regulatory constraints. For instance, WhatsApp/Meta is not authorized to provide financial services in several African countries, including Ghana, limiting the ability of entrepreneurs to use the platform for financial transactions.

Under these conditions, smaller enterprises may find it more effective to prioritize frugality rather than a strategic, planned, and optimized approach to digital resources. They make use of readily available resources, often making do with "odds and ends" (Baker and Nelson 2005), to create innovative solutions to overcome infrastructural (e.g., energy, telecommunications) and capability constraints (Oborn et al. 2019, Senyo et al. 2022). Some instead rely on everyday digital technology (Chan et al. 2020) and integrate their approach into local practices and norms and the situation at hand (Slavova and Karanasios 2018). This creates a significant dilemma for enterprises that are unable to fully harness digital technologies. According to the digitalization literature, the inherent properties of editability, recombinatory potential, and modularity position digital technology as a valuable resource for achieving organizational goals (Vial 2019, Piccoli et al. 2022, Etienne Fabian et al. 2023) and open up new possibilities for value creation (Garud and Karnøe 2003, Oborn et al. 2019). These characteristics also enable independent development and integration of technology into a wide range of systems, allowing for innovation that surpasses what is possible with traditional IT (Yoo et al. 2010, Piccoli et al. 2022). This flexibility means enterprises can move beyond the traditional competitive focus on valuable, rare, inimitable, and nonsubstitutable resources (Barney 1991). This enhances their combinative capabilities by allowing technology designers and users to create unique and flexible value pathways (Henfridsson et al. 2018).

Despite these important insights, research on digital technology and value creation have prioritized the

focus on strategic uses, recombination, and repurposing of digital technologies in resource-abundant contexts, focusing on positive impacts such as enterprise innovation and innovative value creation (Henfridsson et al. 2018). In contrast, few studies examine emerging digitalization paths (Garud and Karnøe 2003, Oborn et al. 2019), the impact of resource constraints, and the need to make do. As such, the literature overlooks the challenges and constraints faced by enterprises in resource-limited settings, neglecting how some digitalization approaches may reinforce existing limitations rather than foster development. This underscores the need for a theoretical shift that accounts for the specific conditions of digitalization in resource-constrained environments, where enterprises have no other choice but to turn to frugal and alternate approaches. For this reason, we turn to the theory of bricolage.

2.2. The Theory of Bricolage

Building on the seminal anthropological work of Levi-Strauss (1966) and developments in entrepreneurship, management, and IS research (Ciborra and Lanzara 1990, Ciborra 2002, Baker and Nelson 2005, Duymedjian and Rüling 2010), the theory of bricolage explains how enterprises with limited resources can "create something from nothing" (Baker and Nelson 2005, p. 329), be innovative, scale, and even outperform firms with more abundant resources. In contrast to an ideal-typical manager/engineer who uses predefined resources that correspond to an exact strategy or design requirement, entrepreneurs who practice bricolage—bricoleurs—do not wait to have the "right" tools, resources, or skills (Senyard et al. 2014). Rather, they draw on a repertoire of valuable secondhand and repurposed materials, old components, or resources (Lanzara 1999, Duymedjian and Rüling 2010) "available very cheaply or for free" (Baker and Nelson 2005, p. 326), and often deemed obsolete by others. These resources are used in a way that goes beyond traditionally accepted practice (Lanzara 1998, Senyard et al. 2014). In this manner, bricolage presents an alternative to optimization strategies that depend on procuring and using high-quality resources (Halme et al. 2012, da Silva et al. 2023). Bricoleurs also consider preexisting networks of contacts as immediate resources at hand (Ciborra 2002, Baker et al. 2003). Examples of small enterprises rearranging and making do with technology include using computer code developed for Antispam to create an online news aggregation service, using the structure of predeveloped software to create a new consumer blogging platform (Fisher 2012), or using old software combined with a "homegrown" spreadsheet to streamline billing (Baker and Nelson 2005). IS scholars have also observed these practices when studying how communities of practice improvise with various hardware components and their technical know-how (Zorina 2021). Indeed, for early proponents of bricolage, IS design was frequently seen as an improvisational, meandering activity characterized by serendipitous combinations of existing programs and failed components put to unexpected uses (Ciborra and Lanzara 1990, Lanzara 1999, Ciborra 2002); designers "paste together a few components into 'something', see how it looks, play with it, check if it works, evaluate, modify or reject," not knowing "in advance what the final configuration is going to be" (Lanzara 1999, p. 337).

These examples present technology as a set of means that can be (re)assembled at will (Ciborra 1996, 2002). Furthermore, they highlight that value creation is anchored in a bricoleur's cognitive resources, skills, and worldview (Baker and Nelson 2005, Duymedjian and Rüling 2010, Baier-Fuentes et al. 2023) and the bricoleur's ability to reject the limitations of the environment, privilege the here and now (Baker and Nelson 2005), and see how combinations of resources at hand can be applied to solve emergent problems and opportunities (Baker and Nelson 2005, Duymedjian and Rüling 2010). This entails permutation and substitution, experimentation, (re)arranging, (re)combining, and (re)negotiating available resources. Put differently, bricoleurs "make it up as they go along" (Senyard et al. 2014, p. 214). They are satisfied with the outcome of the bricolage as soon as their arrangement meets an "it works" stage, in contrast with ideal-typical manager/engineers, whose outcomes correspond closely to their initial plans (Duymedjian and Rüling 2010) and whose work is evaluated against predefined levels of quality, performance, and cost.

Research across the domains of IS, entrepreneurship, and management offers contrasting insights on the impact of bricolage and the value creation it enables. Most studies consider the positive impacts of bricolage. These include the "brilliant unforeseen results" (Lévi-Strauss 1966, p. 17) it produces, the flexible organizational responses to dynamic and fast-changing environments it enables (Bechky and Okhuysen 2011), as well as the way it allows value and innovation (Halme et al. 2012) to naturally evolve into higher degrees of functionality (Garud and Karnøe 2003) (see Online Appendix I for a detailed summary). Nonetheless, the literature also indicates challenges and negative organizational impacts (Baker and Nelson 2005, Duymedjian and Rüling 2010), including difficulty linking individual resources and knowledge (Duymedjian and Rüling 2010).

Noting their different organizational impacts, Baker and Nelson (2005) made a distinction between a moderate, "selective" form of bricolage and a more extensive "parallel" form. Selective bricolage is a form of restrained bricolage that enterprises use across fewer areas and in combination with conventional approaches. This allows them to scale upward and be attractive to more mainstream markets. Onwuegbuzie and Mafimisebi (2021)

show, for example, that bricolage among African entrepreneurs is scalable when combined with conventional processes that enhance their bricolage and innovative capacity. Selective bricolage is rarely considered in IS studies and then most typically as an occasional organizational practice or as a means to deal with short-term expertise and resource gaps (Hartl and Hess 2019, Do Vale et al. 2021).

Parallel bricolage, by contrast, is a form of pervasive bricolage. Enterprises make do by applying available resources to solve problems and either do not follow conventional methods or follow them to a limited extent. Whereas few smaller enterprises can hope to perform all their activities at the highest level of quality and performance, relying on large amounts of bricolage may result in too great a proliferation of "good enough" solutions, rather than an inclination for further improvement (Baker et al. 2003, Senyard et al. 2014). Such second-best solutions and compromises (Baker and Nelson 2005) do their job but are often imperfect and contain internal bugs and restrictions (Lanzara 1999). An overreliance on preexisting networks can also hinder bricoleurs from innovating beyond the scope of their established relational connections, reducing the ability to explore new opportunities. This may help enterprises survive in the here and now but makes their offerings unattractive to markets (Baker and Nelson 2005) and creates path dependencies and lock-ins with customers who did not demand (or could not afford) anything better (Baker and Nelson 2005). Steffens et al. (2023) refer to this as the tinkering trap, where there is a continual accumulation of compromises and second-best solutions that can reduce or even fully offset any positive effects of bricolage on innovation. In counterpoint, though, bricolage practices can be hard to imitate (Lanzara 1999, Ciborra 2002) and, as such, can be a source of competitive value.

The idiosyncratic nature of bricolage makes it harder for smaller enterprises to use a given arrangement or solution independently of its creator (Duymedjian and Rüling 2010). It is often deeply entwined with the bricoleur's identity as they "always [put] something of himself [or herself] into it" (Lévi-Strauss 1966, p. 21). Consequently, the bricoleur often becomes indispensable and has limited attention and resources for improving stop gaps, posing significant challenges to organizational scalability and growth. For the manager/engineer, on the other hand, creation and utilization/consumption are separated (Duymedjian and Rüling 2010); once finalized, the manager/engineer's innovation can operate independently of them.

2.3. Toward a Theory of Digitalizing with Digital Bricolage

Building on insights from entrepreneurial and IT bricolage, we introduce the concept of "digital bricolage" to understand how microenterprises can effectively digitalize in resource-constrained environments. We define digital bricolage as *making do a digitalization through the creative and adaptive use of combinations of available digital resources to address problems and create value*. We argue that it is particularly necessary as a practice in resource-constrained environments where conventional digitalization solutions are either impractical or unavailable because of challenges such as limited access to formal banking, institutional voids, and underdeveloped digital infrastructures and capabilities (Gomes 2023). At the same time, it is an approach that allows resource-poor enterprises to tap into the unique flexibility and modularity of digital resources (Vial 2019, Piccoli et al. 2022, Etienne Fabian et al. 2023), enabling them to create value by reimagining the use of existing technologies. Whereas entrepreneurial, IT, and digital bricolage all embody the creative use and recombination of available resources in ways that go beyond planned and conventional approaches, Table 1 and the subsequent discussion specifically highlight how digital bricolage is distinct in several key ways.

As summarized in Table 1, digital bricolage stands out from entrepreneurial and IT bricolage in several significant ways. First, entrepreneurial bricolage draws on tangible (e.g., secondhand materials) and intangible (e.g., social networks) resources (Baker et al. 2003, Baker and Nelson 2005). It privileges bricolage with physical odds and ends that are fashioned into new artifacts and their subsequent impacts on organizational survival, growth, and innovation (Baker and Nelson 2005, Senyard et al. 2014, Baier-Fuentes et al. 2023), for example, combining old electrical components (testing equipment, power transformers, and components scavenged from TVs and other electronic devices) into a tool for technicians troubleshooting underground cables (Baker and Nelson 2005). The nature of digital resources does not always allow for such straightforward resource substitution. For example, digital resources often require integration with other platforms or infrastructure, which may not be feasible in contexts marked by infrastructural constraints and institutional voids. Furthermore, the literature on IT bricolage has primarily concentrated on the creation of IT artifacts through technical tinkering with hardware and repurposing of computer code to develop sophisticated software and infrastructures (Lanzara 1998, Fisher 2012, Zorina 2021). This overlooks the modularity and flexibility that are characteristic of digital resources, such as mobile platforms, cloud services, and social media (Henfridsson et al. 2018). These characteristics may allow businesses to innovate and scale through context-specific solutions without the need for costly, fully integrated systems, enabling adaptation

Table 1. Comparison of Entrepreneurial, IT, and Digital Bricolage

	Entrepreneurial bricolage	IT bricolage	Digital bricolage
Resources	Physical or intangible assets are on hand (e.g., secondhand materials, old components, personal networks).	IT tools, including hardware, software, and their components, are recognized for their flexibility and potential for emergent uses.	Digital resources are inherently modular, flexible, and have combinatorial possibilities.
Processes	Repurposing, substitution, and permutation of available resources; grounded in in-depth knowledge of both available resources and the environment.	Tinkering with and repurposing available IT and its components.	Processes, potential, and impacts remain to be explored.
Impacts	Enterprise survival and innovation are achieved using limited resources. However, intensive bricolage can lead to nonscalable solutions, potentially limiting long-term growth.	Enables development of innovative and emergent technological solutions and practices.	
Exemplar references	Duymedjian and Rüling (2010), Senyard et al. (2014), Steffens et al. (2023)	Ciborra (2002), Garud and Karnøe (2003), Zorina (2021)	This study

to evolving market conditions (Henfridsson et al. 2018, Vial 2019).

As such, both entrepreneurial and IT bricolage have overlooked the distinctive properties of digital resources (Yoo et al. 2010, Henfridsson et al. 2018, Pentland et al. 2022, Piccoli et al. 2022). Unlike traditional resources that are prized for their scarcity and inimitability (Barney 1991), digital resources enable innovative, emergent value pathways for enterprises (Henfridsson et al. 2018, Oborn et al. 2019). Their value is not fixed but fluid, shaped by evolving assemblages and interactions between people, firms, and technology (Henfridsson et al. 2018). Access to a range of digital technologies increases the potential for connections and recombination, enabling enterprises to create value and boost the creation and realization of strategic opportunities (Henfridsson et al. 2018). Consequently, enterprises that create more connections between digital technologies, and that can repurpose and reimagine these connections, achieve higher value and enterprise growth (Henfridsson et al. 2018). Such technologies are also an opportunity for rapid modular but scalable innovation with open-ended potential (Yoo et al. 2010, Henfridsson et al. 2018) of a kind not possible with the combinations of discarded physical or IT artifacts used in entrepreneurial and IT bricolage.

In this way, digital bricolage is focused more on making do through creative and adaptive use of combinations of available digital resources than on creating new digital technology. This approach may be a necessary practice for many smaller enterprises if it is not possible to undergo digitalization as a planned digital strategy driven by advanced digital technology. Theoretically, this approach broadens our understanding of digitalization, revealing the various paths it can follow and the tendency for idiosyncratic outcomes that may lack scalability and replicability. However, insights into the processes and impacts of digital bricolage remain limited, and further research is needed. Theories of digital value creation often assume easy access to digital resources and positive outcomes from the creation of novel combinations and connections between them. But further exploration is needed of whether and how digitalization through digital bricolage can unlock an open-ended value creation potential while contending with infrastructural limitations and institutional gaps. To increase understanding of the paths and impacts of digitalization through digital bricolage, we conducted a study of microentrepreneurs in Ghana's resource-constrained environment.

3. Method

3.1. Research Design and Setting

To investigate how microenterprises digitalize in resource-constrained environments, we undertook a qualitative study in Ghana from January 2022 to September 2023. The focus on microenterprises, where decisions are typically made by one person, matches with the view of the bricoleur as a solitary figure (Lévi-Strauss 1966, Baker and Nelson 2005). The setting of Ghana is also relevant to our theorizing in several ways. First, microenterprises, defined in Ghana as having fewer than five employees and under $25,000 USD in annual turnover and assets (MTI 2019), make up a dominant share of businesses. Out of the estimated 2.1 million businesses in the Ghanaian micro- and small-to-medium enterprise (SME) sector, about 1.7 million are classified as microenterprises and, between them, employ roughly 2.5 million people (MTI 2019,

GCB 2023). As such, they have the potential to accelerate economic development and poverty reduction because of the sector's role as the primary employer of vulnerable groups, including women, youth, and low-skilled workers, all of whom are also often at the greatest risk of financial exclusion (GCB 2023). As a government participant explained, microenterprises provide a key ingredient for accelerating economic development and poverty reduction: "the informal sector is almost like 70%" (GOV7). Second, Ghana's large microenterprise population is resource constrained and faces threats to its survival and growth, providing a context that often demands creative thinking. Third, despite an underdeveloped information and communication technologies (ICT) infrastructure, mobile phone penetration in Ghana is over 100% (i.e., many own multiple mobile phones). There is widespread uptake of mobile money, with 20 million active accounts in 2022 (Bank of Ghana 2025), plus large numbers of social media users (Sasu 2021). Paradoxically though, the uptake of digital technology by individuals is not matched by the same level of business use (GSS 2020).

3.2. Data Collection

Our data collection strategy was qualitative and embedded in the local context, with data collected from 45 microenterprises. We expanded the sample to include 10 more organizations and 24 interviews to capture a wider range of stakeholders, namely, government actors, mobile network operators, fintechs, and a technology developer, and shed light on how they support the digitalization of microenterprises. We were able to interview multiple people in each stakeholder organization, which complemented the predominantly one-person view gained from interviews with microenterprises. To ensure rigor, we adopted an insider/outsider approach (Davison 2021), with most interviews and analysis undertaken by one Ghanaian and one non-Ghanaian researcher. Table 2 provides a summary of the data collected, followed by a more detailed description (Table 3).

3.2.1. Microenterprises.

We sought out microenterprises that had developed a digital footprint with varying levels of sophistication. We did this through fieldwork and snowballing, often making first contact via social media or through personal recommendations. These approaches were necessary given that many of the microenterprises were not formally registered and therefore untraceable. Before the interviews, we had informal contact with microenterprises (Baker and Nelson 2005) to explain the research purpose, determine their fit for the study, and gain consent for participation. We focused mainly on microenterprises operating in the Greater Accra region and surrounding towns. As shown in Table 3, we collected data from 45 microenterprises in total, which is a similar number to or greater than other studies (Li et al. 2018, Canhoto et al. 2021, Soluk and Kammerlander 2021). Like Baker and Nelson (2005), we included enterprises from different sectors. Our sample had a balance of female- (27) and male-owned/run (18) enterprises. Interviews focused on the practices and environment of resource-constrained microenterprises and how they were able to leverage their stock of digital resources (see Online Appendix II for sample questions). Of the interviews, 36 were conducted face to face as part of the field research, with the remainder online because of COVID-19 restrictions. Interviews were digitally recorded and then transcribed. Face-to-face interviews took place at shops or places near the target market of the microenterprise. This allowed for observation, providing evidence of the everyday practices of microenterprises, resulting each time in several pages of handwritten field notes. For example, we observed how bricoleurs upload pictures to WhatsApp, how they label enquiries and orders, and how they manage orders and interact with customers online or in person. We were intrigued by how participants juggled the influx of social media enquiries and liaised with motorbike couriers to deliver products to customers. For most microenterprises, especially the one-person businesses, these processes were less organized because the owners had to do everything by themselves. However,

Table 2. Summary of Data

Participant	Data collection	Focus
Microenterprises	45 interviews; more than 18 hours of observation	To understand the process of digitalization and digital bricolage and observe bricolage practices
Government agency	Seven interviews with individuals in one government agency	To understand how government policies and interventions influence the operations and digital transformation of microenterprises
Technology firms	Nine interviews with individuals from seven fintechs, four interviews with individuals from one mobile network operator, four interviews with individuals from one technology organization	To understand how technology firms develop innovation and services that support the digitalization of microenterprises

Table 3. Details of Microenterprises

ID[a]	Product/service	Number of employees[b]	Business location	Years operating	Registered	Bricks/clicks
ME1a	Herb products	6	Metro/home	3	No	Both
ME2a	Footwear	2	Metro/shop	4	No	Both
ME3d	IT services	3	Metro/office	9	Yes	Both
ME4a	Cosmetics	3	Metro/home	3	No	Clicks
ME5b	Footwear/clothing	1	Town/home	3	No	Clicks
ME6d	Clothing	12	Metro/shop	5	Yes	Both
ME7d	Electronic appliances	2	Metro/shop	4	Yes	Both
ME8b	Jewelry/home decorating	4	Metro/home	4	No	Clicks
ME9a	Fabric	1	Town/home	4	No	Clicks
ME10a	Baby products	2	Metro/shop	3	No	Both
ME11b	Clothing	7	Metro/shop	4	No	Both
ME12c	Books	1	Metro/home	1	Yes	Clicks
ME13a	Bedding	1	Metro/home	2	No	Clicks
ME14b	Clothing	4	Village/shop	5	No	Both
ME15d	Event equipment	4	Metro/shop	3	Yes	Both
ME16a	Food (catering)	4	Metro/shop	8	No	Both
ME17c	Food (catering)	6	Suburb/home	4	Yes	Clicks
ME18a	Makeup artist	1	Metro/home	3	No	Both
ME19a	Food (distributor)	3	Metro/shop	2	Yes	Both
ME20b	Seamstress	7	Metro/home	1	No	Clicks
ME21a	Seamstress	6	Village/shop	5	Yes	Clicks
ME22d	IT services	1	Metro/shop	3	Yes	Both
ME23c	IT services	4	Metro/home	5	Yes	Clicks
ME24b	Money lending	1	Metro/home	10	No	Clicks
ME25d	IT services	9	Metro/office	3	Yes	Clicks
ME26d	Electronic appliances	8	Metro/shop	4	Yes	Both
ME27a	Clothing	4	Metro/shop	3	Yes	Both
ME28d	Clothing	9	Metro/shop	5	Yes	Both
ME29a	Body lotion	1	Metro/home	4	No	Clicks
ME30a	Fabric	1	Metro/home	3	No	Clicks
ME31c	Clothing	2	Metro/home	10	Yes	Clicks
ME32a	Clothing	1	Metro/home	3	No	Clicks
ME33d	Art/décor	2	Metro/home	3	Yes	Clicks
ME34b	Food (products)	2	Metro/home	1	Yes	Clicks
ME35b	Fabrics/clothing	3	Metro/home	3	Yes	Both
ME36c	Kids' toys	1	Metro/home	6	Yes	Clicks
ME37b	Clothing	1	Metro/home	6	Yes	Clicks
ME38b	Food	1	Suburb/home	5	Yes	Clicks
ME39d	Fabrics/clothing	5	Suburb/home	7	Yes	Both
ME40d	Event planning	5	Metro/office	5	Yes	Both
ME41a	Kitchen appliances/utensils	2	Metro/home	1	No	Clicks
ME42d	Art/art events	3	Metro/shop	6	Yes	Bricks
ME43d	Consultancy	5	Metro/home	10	Yes	Clicks
ME44d	Wines and beverages	5	Metro/shop	<1	Yes	Both
ME45b	Cosmetics	1	Metro/shop	4	No	Clicks

[a]Labeling denotes the level of bricolage: a, parallel digital bricolage; b, selective-frequent digital bricolage; c, selective restrictive digital bricolage; d, digital planning with no/minimal digital bricolage.
[b]Including owner. Employees tend to be fluid and part-time. The number reflects the maximum total individuals.

for more established microenterprises, everyday business operations were much smoother, as work was clearly delegated among different workers (see Online Appendix III for field insights).

3.2.2. Stakeholders. To complement our microlevel view, we included government agencies that develop policies around financial inclusion, loans, and business development and technology firms delivering financial technologies, infrastructure, and business applications such as account management (see Table 2). To access these organizations, we relied on a large technology firm with a significant presence in Africa, the International Telecommunications Union, and networks developed through past research. These interviews covered how microenterprises used the firm's services and their participation in digital transformation initiatives in Ghana (see Online Appendix II for

sample questions). Of these interviews, nine were online because of COVID-19 restrictions. At respondents' offices, we observed the organization and its digital technologies in practice. For instance, a software firm showed us the onboarding process for new users on the app it had developed for microenterprises. We documented our observations and interviews in field notes.

3.3. Data Analysis

Our analysis followed a constructivist approach from grounded theory (Charmaz 2006). It elicited diverse experiences (important for capturing unique bricoleurs' resource repertoires and recombination) and constructed conceptual categories through interactive interpretation between the data and existing knowledge. We analyzed the data as we collected it, allowing us to continue gathering data until no new information emerged. Table 4 outlines our analytical procedures.

We first started with initial coding. Analyzing data from microenterprises, we developed digital profiles and coded instances of digitalization processes and resources for each of the 45 microenterprises. The analysis revealed key technologies, how they were used, and the challenges faced in their digitalization. To understand technology use, we started to distinguish between frugal practices, repurposing, making do, and assemblages (Baker and Nelson 2005) from use recombination (Henfridsson et al. 2018) and more conventional use as understood in IS. Data from other stakeholders helped map resource constraints as well as the initiatives to support microenterprises. For instance, fintech firms told us how microenterprises use their services, whereas government agencies spoke of the challenge to get microenterprises to use digital services. We cross-checked our interpretations by comparing stakeholder responses with those from microenterprises.

We proceeded with focused coding, identifying key saturated codes and their relationships. To do this, we compared and integrated our data with existing literature (Charmaz 2006) and aggregated the codes into higher-level codes for digitalization paths such as *parallel* and *selective digital bricolage* and *digital planning* (Baker and Nelson 2005) (see Online Appendix IV). For example, the category of digital planning is akin to the notion of an engineer/planner (Baker and Nelson 2005) and aligns with the established narrative of digitalization for smaller enterprises (Etienne Fabian et al. 2023,

Table 4. Key Steps of Data Analysis

GT steps	Details	Outcome
Initial coding	• *For microenterprises*: building a digital profile of the microenterprises; coding instances of digitalization processes and resource constraints; differentiating cases and unearthing the practices, events, decisions, and outcomes of microenterprises as they undergo digitalization. • *For stakeholders*: mapping the range of environmental constraints experienced by microenterprises and initiatives to support microenterprises.	Developing saturated codes about microenterprise digitalization with digital bricolage to theorize its properties, how it develops, how it is maintained and/or changes.
Focused coding	• Identifying core concepts and their relationships. Following surprising or unexpected codes. Labeling bricolage processes and digital bricolage trajectories for each microenterprise. • Writing memos about digitalization processes and their relationship to resource constraints to bridge the gap between coding and theoretical analysis (see Online Appendix III). • Comparison with literature to understand and logically connect surprising or unexpected gaps. • Comparison and superposition of digitalization pathways and their shaping factors and boundary conditions: - analyzing uses of technology (Online Appendices IV and V). - analyzing digital value connections (Online Appendix IV).	Insights on distinctive digitalization paths across parallel digital bricolage, selective digital bricolage, and digital planning. Saturation and emergence of theoretical categories when no new properties of substantive codes are found. Initial model of microenterprise digitalization with bricolage.
Theoretical coding	• Refining emergent theoretical categories with those from literature on bricolage and digitalization to theorize how microenterprises make do with their digitalization.	Refined model of microenterprise digitalization with bricolage (see Figure 1).

Li et al. 2023). To bridge coding and theoretical analysis, we wrote memos about concepts and their relationships (see Online Appendix III for example). Relying on abductive reasoning, we explored and connected surprising gaps, refining our understanding of digitalization shaped by both bricolage and planned strategy. This revealed the extent of bricolage (Baker and Nelson 2005) and how the three paths differed in technology diversity/depth in use and embeddedness in an owner's capabilities. This allowed us to distinguish elements of digital bricolage and construct the different pathways and impacts as a spectrum. We looked at the depth, breadth, and frequency of technology use to understand the role of technology diversity for enabling value creation across the three digitalization paths, using the notion of digital connections to understand combinations of the digitalization assemblages (see Online Appendix IV). Our analysis showed that technology diversity and digital connection potential were the lowest for parallel digital bricolage and the highest for digital planning. Through this analysis, we settled on our model of digital bricolage and digitalization in resource-constrained environments, including the concept of the digital bricolage trap (see Figure 1). Throughout this process, we compared and integrated our data with literature on bricolage and digitalization to construct a broader theoretical narrative (Charmaz 2006).

4. Findings

4.1. The Resource-Constrained Environment That Influences Microenterprise Digital Bricolage

Microenterprises in Ghana operate in a penurious socioeconomic environment, exacerbated by high levels of unpredictability and complexity, hampering their ability to predict and plan, not only for the long term but even for the following day (Gomes 2023). Our analysis identifies several pertinent factors that made the traditional planned approach to digitalization largely unattainable for many enterprises, motivating them to seek unconventional paths for their digitalization.

First, microenterprises experience significant challenges in accessing formal financial instruments, capital, and other forms of institutional support. More than half of the population lacks access to traditional banking facilities, resulting in reliance on mobile money payments for business transactions (Senyo et al. 2022). All enterprises in the study used mobile money payments (e.g., MTN MoMo, Vodafone Cash, Airtel, Tigo, and Zeepay): "a mobile wallet is everything for them" (GOV7) (see Online Appendices IV and V). Enterprises also faced obstacles accessing government support: "The government doesn't support … They rather take from you" (ME34b). Official government support programs for microenterprises were announced during the COVID-19 pandemic. However, none of the enterprises we interviewed were able to access these because of their unregistered status, the complexity of the application process, and, in some cases, failure to receive support even after submitting applications:

> I haven't done that. Because I'm an online shop, I don't know how to file my tax returns and all those things. So, I know if I apply maybe I will be disqualified. —ME5b

> We did (register for support), but we never heard anything from them —ME3d

Second, enterprises often faced unreliable infrastructure ("we have the on and off frequent power outage" (ME37b)). Further, challenges related to trust, cybersecurity, and the limited technological skills among the population often rendered ineffective conventional digital technologies such as websites, email, or market platforms:

> A lot of people don't really believe in this online stuff and digital stuff … it's a big problem in Ghana with the cybercrime. So, people see things online, they follow through, they pay, and they don't get their item. They get duped. So, *people don't really have trust for that* … You bring policies, you bring innovative ideas and all that, but people and the ecosystem are crashing it —ME23c.

Third, some participants explained that they started their enterprise because of a lack of formal employment opportunities: "Even people who had come out of the university now have joined the informal sector" (GOV7). As such, they leveraged technology, as both a response and requirement, to pursue modest "small endeavors" or "side hustles."

The combination of these situational factors and constraints significantly limited access to digital resources, meaning enterprises had to embrace a form of digitalization that is emergent, situational, and frugal, reflecting practices deeply embedded in the local context: "You know, everything depends on you, yourself. It's how you yourself you do it" (ME4a).

Our findings recognize that microenterprises did not uniformly experience the same intensity of resource constraints and, as a result, engaged in differing levels of digital bricolage. We capture this variation as a spectrum of digital bricolage practices, derived from a sequence of behaviors that we have repeatedly observed and which are in interplay with the characteristics of their local environment and resource constraints. As Table 5 shows, these digitalization paths can be broadly categorized into *digital bricolage*—applying digital bricolage either pervasively or selectively in their digitalization efforts—and *digital planning*—exhibiting a more structured and strategic approach to digitalization with

Table 5. Microenterprise Digitalization Paths in Resource-Constrained Environments

	Parallel digital bricolage	Selective digital bricolage	Digital planning
Cases	35.55%	33.33%	31.11%
Digital assemblages	Relies mostly on personal digitalization tools (e.g., personal WhatsApp, mobile money) and free technologies	Relies on a mixture of personal digitalization tools and free technologies, as well as paid-for and business-specific technology	Relies mostly on conventional technologies with no or minimal bricolage
Technology diversity	Low	Moderate	High
Digital value connections	Low	Moderate	High
Organizational impact	Parallel digital bricolage trap	Selective digital bricolage trap	Digital growth orientation
Key constraints	• Reliance on relational networks, embedded in the informal sector, excluded from formal financing and support mechanisms • Limited technology depth and breadth, limiting ability to fully harness digital technology • Difficulties in integrating technologies, hampering operational efficiency and scalability • Accumulation of operational compromises and overdependence on personal digital capabilities that may not scale or adapt • Persistent privacy and fraud concerns • Higher reliance on the owner to hold together a digitalization		Less extensively impacted by the key constraints experienced by digital bricoleurs.

Note. Online appendices provide further evidence of resource constraints and digitalization paths.

no or minimal bricolage. Whereas each is portrayed as analytically distinct, the categories are more dynamic in practice. Enterprises may shift from one path to another, progressing from parallel to selective bricolage over time, as we demonstrate below. As summarized in Table 5, digital bricolage may lead to varying impacts, including the digital bricolage trap—a situation where bricolage eases immediate resource constraints and supports survival but leads to an accumulation of compromises that hinders the development of digital maturity. We explain the key digitalizing paths below. As we are concerned with developing the theory of digital bricolage, we focus predominantly on that practice.

4.2. Digitalization with Parallel Digital Bricolage

Microenterprises that follow this path apply digital bricolage across all their digitalization activities. They rely on and recombine familiar, free, or low-cost digital technologies, such as free versions of WhatsApp, social media platforms such as Facebook and Instagram, and mobile money solutions as the foundations of their digitalization efforts.

> There are those who sit in their homes and just display their details on their WhatsApp status or via Instagram pages and then they receive payment from all over onto their wallets or bank accounts. And … *it's a game changer for them*. —GOV6.

A common practice involved repurposing a technology used in other contexts for business. For example, enterprises mostly used personal mobile money and bank accounts, designed for person-to-person rather than business transactions, thus incurring no sunk costs when compared with a merchant mobile payment solution: "I used my personal mobile money, and it is not a merchant sim. I don't have the merchant sim, it is just the private one" (ME32a).

Through experimenting, substituting, and learning by doing, digital bricoleurs developed a deep understanding of their stock of digital resources. This approach enabled them to identify what works best for the enterprise and to create functional and innovative assemblages over time that were "simple" and "convenient" (ME1a), addressing immediate resource constraints and uncertainties. Table 6 provides examples of digital bricolage practices and recombination and, importantly, highlights the digital technologies that were not employed.

As the table above and our discussion show, parallel digital bricolage is characterized by a relatively *low technological diversity* (see Online Appendix IV). This is seen in the heavy dependence on messaging and social media platforms such as WhatsApp, Instagram, and Facebook for communication and market operations. These platforms also enabled enterprises to work from home or from small, dedicated premises, needing no additional digital or physical infrastructure beyond smartphones. Several owners ran their enterprise on their smartphone only and did not use a computer or laptop: "*I use my phone for everything. It's just my phone. It's just my phone, so everywhere that I am*. I could be at church and I'm still doing my business" (ME9a). While offering many benefits, reliance on mobile phones also restricted the adoption of more advanced technologies:

> I don't use Jiji (digital marketplace) anymore because my phone got spoilt and I don't want to give pressure to the new phone, so I have decided to only use it for WhatsApp. —ME32a.

Reliance on mobile phones also meant infrequent use of desktop software such as Microsoft Office or accounting applications, and even emails saw minimal or infrequent use. Business websites and selling/buying platforms (e.g., eBay, Jumia, Jiji, Tonaton) were not used, and there was less use of cloud storage (e.g., OneDrive, GoogleDrive) compared with enterprises engaged in selective digital bricolage or digital planning. Instead, many enterprises opted for ad hoc methods such as using pen drives to share large files or storing hard drives in physical safes as a backup measure, thereby avoiding the costs, infrastructure requirements, physical space, and advanced digital skills associated with cloud storage. Seeking to address economic constraints, they also turned to personal mobile money loans to support their business operations (only one enterprise of the other groups did so). A mobile network operator offering mobile money loans confirmed its repurposing in this way:

> You meet them [micro-enterprises], and they will say, "your product [mobile money micro loan] is helping me. I'm able to borrow up to GH¢1,000. I bought a few products. I've paid back. I'm able to borrow again" —MNO3.

Enterprises that digitalized in this way tended to construct value creation spaces (Henfridsson et al. 2018) defined by low-digital-value connections (see Online Appendix IV). That is, whereas they were able to create some value and derive benefit by "making do," their digitalization was characterized by a *limited* range of technological options, relying primarily on *free* features and utilizing *fewer* technological combinations. In this way, parallel bricolage helped microenterprises to survive in resource-constrained conditions. However, it also led to a *digital bricolage trap*: a condition where an evolving network of digital resources and their combinations eased immediate resource constraints and supported survival but led to an accumulation of compromises that hindered the development of digital maturity. Enterprises recognized the benefits of parallel bricolage, noting, "It has helped me reach a wider number of people than having an in-store

Table 6. Technology Uses in Parallel Digital Bricolage

Technology	Use[a]	Examples	Illustrative quotes
Messaging	b r	Using personal accounts for business Relying on multiple platforms	"I was already into WhatsApping and Facebooking … I started this business, because I didn't have a shop, and I, I saw some people advertising their products on Facebook and WhatsApp" (ME2a)
Social media	b r	Using personal accounts for business Recombining platforms for collecting orders	"I used Facebook … [then I switched to] WhatsApp for business so that it can auto-reply to enquires" (ME32a) "I did what we call MeetMe online, Facebook … (and) Instagram … so … you just put [your order] there" (ME27a)
Cloud-based apps	b	Avoiding the cost of cloud storage by using physical hard drives	Using pen drives to share large files; storing hard drives in a physical safe as a backup procedure
Desktop apps	b	Using Word as an order management system	"So I was using the Word to do my data-entry orders. So I really use that." (ME27a)
Online banking	b r	Using personal bank account for business Using mobile money with personal bank account	"I don't usually like queuing at the bank so I transfer [mobile payments]to my bank account." (ME10a) " … anyone on the platform who is interested gets to select and pay by … Vodafone and MTN" (ME41a)
Mobile money	b, r	Combination of personal mobile money account and messenger	"I give … my mobile money account. So when you make payments, you send a screenshot so as to confirm really you made the payment … So that we all be on the same page. It serves as a receipt to you and myself" (ME41a)
Mobile money loan	b	Using mobile money loans meant for personal use for business	Personal microloans, intended for individual needs, are injected into the business to incrementally develop their businesses or help with start-up costs.

[a]Examples of digital bricolage (b) and recombination (r).

presence" (ME41a), and "With digital tools … we are financially stable" (ME21a). Simultaneously, though, a digital bricolage trap manifested in the technical, organizational, and strategic compromises described below.

First, in some cases, reliance on parallel digital bricolage led to suboptimal solutions and technical and organizational compromises, trapping enterprises in the informal sector, for example, operating with limited access to finance ("My brother, I did not receive any support, it's a one-man business, so they don't even know that they have to support" (ME27a)) and encountering bureaucratic hurdles ("and then you also need, additional money to go and do the registration" [ME1a]), enterprises had to rely on personal mobile money accounts (rather than merchant accounts) that brought with them withdrawal fees (passed on to customers) and a maximum limit on daily funds transfer.

Second, whereas parallel digital bricolage provided a means for "testing the waters" (ME9a) and leveraging their relational networks for support and promotion, heavy dependence on digital bricolage solutions, such as using WhatsApp personal accounts for business, led to strategic compromises (e.g., "I can only serve people on WhatsApp and people I know, *but that doesn't go far*" (ME13a)). In their efforts to experiment and reach wider markets, these enterprises tried to include market selling digital platforms as part of their digitalization. In addition to their cost and inconsistent pattern of use ("I was trying to use Jumia" (ME27a); "But I haven't been very consistent there" (ME9a)), the well-defined, routinized ways of working with these platforms were incompatible with the spontaneous nature of a digital bricolage approach. The only enterprises that successfully used a market selling platform were those engaged in digital planning.

Third, these enterprises became stuck in the here and now through overreliance on emergent practices and situational opportunities: "*I make up things as and when they occur*" (ME45a); "*I just make strategy when things occur*" (ME16a). This exacerbates the cognitive and technological skill constraints that, over time, compound operational constraints; enterprises depend on limited digital capabilities, their relational networks, and technologies at hand: "my friend [an IT teacher] was able to guide me" (ME21a); "My brother supports … He is into IT" (ME4a). This approach overcame the issues raised by digitalizing with unknown or possibly irrelevant solutions and reduced the need for costly external support. However, it also reduced the potential for strategic technology choices, effective innovative recombination, and enterprise digital growth. For example, it was common practice among these enterprises to take photos of products in the warehouse and upload them to their social media accounts. While minimizing stock and space costs, it often acted as a hindrance to scaling because of randomness. After posting an image of a product on a personal WhatsApp account, an enterprise might receive a query along the lines of "Can you get this shoe in size nine?" However, by the time the enterprise checks the order, receives confirmation from the customer, and processes payment, the supplier (warehouse) may no longer have the item (this contrasts with the traditional practice of African businesses of stockpiling items (Kamoche 1997)). Customers who may not demand or be able to afford higher quality rely on these substandard processes, perpetuating the trap of digital bricolage (Baker and Nelson 2005). This inherent tension was recognized by some enterprises that wanted to advertise to wider markets but were locked in by their own inefficient processes. For instance, ME9a explained that "if I want to do [advertise on] Instagram, I should be able to bring the stuff in myself." However, their current model relies on informal suppliers.

Fourth, the compromises of parallel digital bricolage revealed themselves when dealing with technological, fraud, and regulatory constraints. For example, by using personal social media with personal mobile money accounts, digital bricoleurs missed out on added-value features of merchant accounts, such as seamless refunds, system integration, and security protection: "Sometimes some people can tell you they've paid, but when you check, it hasn't come" (ME18a). As a result, nonpayment and fraud were frequent, and the need for constant monitoring drained the owner's time. This pushed some enterprises to revert to cash. This contrasts with the experience quoted below from an enterprise that did use a merchant account:

> Whoever is sending you money pays less on charges. For the merchant, you are not being charged on withdrawing, so customers are only charged for the product … As a business owner, you can receive lots of money on the merchant sim, the personal [mobile money] limit is 5,000 cedis [approximately $422 USD]. —ME31c.

Parallel digital bricoleurs were also particularly sensitive to the impact of a recently introduced e-levy on mobile payments for those using personal mobile money for business transactions: "I feel the e-levy will 'steal' a lot of our profits" (ME10a). This enterprise was also frustrated by constant cybersecurity threats and digital payment fraud experiences, showing a double setback indicative of the digital bricolage trap. In addition, such makeshift arrangements burden the enterprise owner with single-handed maintenance of their digitalization. As one enterprise stated, "it [the digitalization] has become part of me" (ME16a).

Enterprises acknowledge the following limitations:

> The way I'm using it isn't the best, so I'm hoping to use it more effectively than what I'm using it right now. —ME2a.

> I am now learning and I'm not perfect —ME21a.

In response, some enterprises were actively seeking ways to advance their digitalization and shift to more structured approaches. For example, some planned to formalize their operations by registering their businesses, transitioning to professional digital accounts, and developing their own applications to simplify customer orders. One enterprise, ME16a, was developing an app to simplify ordering:

> I am currently working on an app through the help of a friend, for both actual and potential customers to order easily, to move my business. —ME16a

These attempts brought mixed results in scaling up digitalization and only partially overcame resource constraints. For instance, ME32a tried using an online market platform but returned to local selling methods, as it failed to address local challenges. In some cases, enterprises were able to climb the ladder of digitalization. Despite initially relying on basic tools such as free social media and a friend's online banking for transactions, ME41a was making a gradual shift toward more structured digital practices. These included digital order management, suggesting a shift to a selective digital bricolage pathway to digitalization.

4.3. Digitalization with Selective Digital Bricolage

Unlike parallel bricolage, some enterprises applied digital bricolage more selectively in their digitalization, relying on it in conjunction with standard paid digital resources designed for businesses (e.g., WhatsApp for Business versus free WhatsApp). This approach allowed enterprises to rely on bricolage as a stopgap or to extract value from a technology with limited sunk costs, gauging its potential before committing to the more advanced, business-focused version: "I transitioned from a personal account to WhatsApp Business" (ME31c). As Table 7 illustrates, digitalization by selective digital bricolage is characterized by a mixture of bricolage, recombination, and conventional use.

Our analysis reveals two distinct applications of selective digital bricolage: *selective-frequent digital bricolage* and *selective-restricted digital bricolage.* In *selective-frequent digital bricolage*, digital bricolage is applied across fewer areas of the business in comparison with parallel digital bricolage. It was typically done in combination with conventional digital resources and free technology. The former provided more features than their free counterparts, and the latter continued to serve as cost-effective substitutes for traditional IT infrastructure. Examples include combining free personal social media accounts with paid advertisements ("so that people who go on social media may just happen to see it" (ME36c)) or using specialized apps (e.g., free version of Canva) to create online flyers and leveraging embedded social media analytics within paid sponsored advertising for insights toward more targeted marketing. For example, ME34b transitioned to some business applications while continuing with a combination of professional services and personal networks to support its digitalization efforts.

Enterprises recognize the benefit of this shift, as shown in the quote below, that transitioning from a personal mobile money account to a merchant account provides more advantages in the long term:

> That's why I even went for the merchant line. Because when you are using your personal money for transactions, it's very, very draining. And customers would not like to put extra charges on it for you. But with the merchants [account] you send money without any charge … the charges were killing me. —ME38b

Selective-restricted digital bricolage is a form of digitalization that instead applies digital bricolage to noncritical areas. This path was often adopted by enterprises that scaled back from heavier reliance on digital bricolage or did not experience severe resource constraints. For instance, ME23c initially relied on a frugal digital assemblage of personal messaging, social media, and mobile money to navigate resource constraints. However, it gradually transitioned to business-oriented versions of these tools, which enabled it to mature digitally and adopt a more forward-thinking approach.

> I started off with WhatsApp. I didn't create the company WhatsApp. I was just using my personal account … but with digital transformation, with the help of this delivery service and [delivery] systems like Yango, I've seen an opportunity of having … my own delivery company delivering my goods —ME23c.

In this way, being selective restrictive in the application of digital bricolage allowed enterprises to navigate the environmental challenges posed by digital infrastructure gaps. They created more sophisticated assemblages, such as integrating various apps, using cloud services, and linking merchant mobile money accounts with online banking. There are some overlaps with parallel digital bricolage in terms of the technologies used in their digitalization. However, enterprises that follow the selective-restrictive digital bricolage pathway are differentiated by a *greater variety and depth of digital technologies used*. Enterprises in this category relied *less on free features* in their digitalization than those relying on parallel digital bricolage

Table 7. Technology Uses in Selective Digital Bricolage

Technology	Use[a]	Examples	Illustrative quotes
Messaging	b, r, c	Combining personal and business accounts/applications	"I didn't create the company WhatsApp. I was just using my personal account. Later I created an Instagram page for the company." (ME23c)
Social media	b, r, c	Combining personal and business accounts/applications	"[We use] Facebook and then WhatsApp. With Instagram, I had a personal account but it was later I converted it to a business account." (ME35b)
	b, c	Using business versions to increase value	"I went to YouTube, I went to learn it. I went and I downloaded Canva for all my digital things, so that my page will look so nice on social media … like Instagram, Facebook, WhatsApp." (ME17c)
		Running analytics on personal accounts	"With the Instagram … you get to know how your ad is performing, how many people boosted your page … purchased your product … you can use that to calculate." (ME34b)
Cloud-based apps	b, r	Using personal cloud storage for invoices	"We use the Google Drive to keep all [records]." (ME12c) "I use Google Drive to keep some of the documents so I can easily share it with the indirect workers." (ME23c)
Desktop apps	b, r	Using Word and Excel to track stock	"I use Word and Excel to keep track of the products." (ME36c)
	b	Using Excel as a loan customer system	"I do use Excel … [for] a database for my customers … information like their names, telephone numbers, the loans that they have requested. I highlight those that have made payment." (ME24b)
	b, c	Using Excel to back up/record sales with a business app	"I was using Excel to record sales. But later on, I found a digital solution. So, they help me take inventory stock of my sales and expenditure. So, all my sales now, and expenses now go into that app. And then be able to back up my data from this." (ME5b)
Online banking	b, c	Transfer from mobile money to business bank account	"I went to … get a loan facility as a business, I was told I had to operate the account … and we did all those things for six months." (ME11b)
Mobile money	b, c	Personal mobile money evolving into a business bank account	"When we first started, because we were mostly using mobile money and … so mobile money was an easier option, but then when we grew, then we got a business account." (ME11b)
	b, r	Personal mobile money accounts	"My [business partner] uses her personal mobile money number for that, or I use my personal mobile money number for that." (ME20b)

[a]Examples of digital bricolage (b), recombination (r), and conventional technology uses (c).

(see Online Appendix IV). With greater technological diversity, they created synergies between their digital resources, for instance, integrating social media and messaging platforms to create a cross-platform customer engagement system that enhanced communication and outreach across multiple channels. This allowed enterprises to develop relatively simple but functional assemblages: "MoMo [mobile money] doesn't integrate with WhatsApp, but you can put your number there. You can integrate the merchant sim with your business bank account" (ME31c). In this way, the actualized digital value connections for enterprises engaged in selective digital bricolage were significantly larger than for those following parallel digital bricolage (see Online Appendix IV).

Enterprises engaged in selective digital bricolage demonstrated a more structured approach than those using parallel digital bricolage. This resulted in notable positive outcomes: modest digital growth, cost savings, streamlined business operations, and an otherwise inaccessible expanded customer base. When discussing their use of social media, enterprises engaged in selective digital bricolage referred to premium social media advertising features such as "boosting and marketing tools and strategies" (ME23c) that enabled them to reach new markets rather than relying predominantly on relational networks. They described how their ordering systems facilitated preorders and improved operational efficiency: "I get preorders. So, I get to know the number of food or the number of cakes I'm supposed to produce, or pastries, or sometimes, most of these, during a day or a week or something" (ME17c).

For these enterprises, the move to less reliance on digital bricolage meant owners were not solely responsible for digitalization. Whereas informal learning continued to play a role in enhancing their digital tools

and capabilities ("I went to YouTube; I went to learn it" (ME17c)), those with a more structured division of labor were able to delegate specific aspects of their digital efforts. These included content creation and management of regular social media advertisements, providing a more streamlined and professional digital presence and allowing the owner to focus on other aspects of their business: "I have a gentleman who handles [social media], he charges me per quarter" (ME35b). Whereas selective digital bricolage creates value and can address resource constraints, it can potentially lead to stagnation. For some enterprises, it may simultaneously stagnate operational efficiency and broader organizational development by perpetuating resource constraints, as the example below demonstrates. One of the few enterprises to develop a website reflects on how the ad hoc nature of selling on Facebook and Instagram contradicted the inscribed process of website sales: "We are always sorting things out. If the person brings it back, it becomes so tedious. In fact, we do manual stockkeeping. We count the stock weekly when we get new stock" (ME11b).

In a context where approximately half of selective digital bricoleurs were unregistered, reliance on selective bricolage provided temporary, albeit imperfect solutions that could delay the shift away from the margins of the informal economy: "registering it [the enterprise] is a lot of problems" (ME17c). Their reliance could further impede progress by restricting access to formal banking services, thus limiting their ability to secure the necessary capital for expansion: "I'm afraid of the interest rates … I will look at the rates and then I don't know what I will use for guarantee" (ME5b). So, whereas some areas became more digitally mature, in other areas, the cycle of makeshift solutions and deferred formalization restricted not only their operational efficiency but possibly, too, their long-term viability and growth. Enterprises acknowledged that their imperfect approach and lack of resources prevented them from finding and hiring employees with IT skills who they could delegate digitalization to: "We had someone who would have managed the platforms for us, but he came with a fee and it was higher as compared with the returns we get" (ME35b). This demonstrates that even though digitalization could function independently of the owner (unlike parallel digital bricolage), there were other compounding factors involved. As with some enterprises who relied on parallel digital bricolage, lack of standard digital processes and reliance on mobile phones meant that enterprises had difficulty integrating with market selling platforms and government support portals: "We have a (microenterprise) merchant portal, but these merchants don't have PCs and things" (GOV7). Likewise, reliance on personal mobile money wallets created difficulties when trying to establish a formal business bank account: "It's a personal mobile money account. I would have to do the registration before they give me a merchant number" (ME37b). Whereas selective digital bricolage provided functional solutions for local needs such as customer communication and payment transactions, these locally tailored solutions relied on limited/free features that could not always meet evolving business needs or scale in terms of recombination of technologies. When asked how they manage sales and customer data, one enterprise explained that its use of free WhatsApp meant that it could not even produce a list of customers, despite having a business website. This indicates a lack of integration.

> Data management? First of all, with WhatsApp, *what are we supposed to do? We don't have a list of our customers* or a customer base on our website, on a spreadsheet or anything, so that's something we were planning to work on. —ME11b.

For other enterprises, ad hoc customer management and ordering systems were incompatible with standardized business applications, hindering the automation, scalability, and overall reliability of business operations. Many experienced online fraud, making them reluctant to take the further risk of expanding their business through large, popular buying/selling platforms: "I have had unpleasant business there, so I decided not to try to use it" (ME31c); "there was a day I even tried buying something on Tonaton and I was scammed" (ME37b). Continued reliance on personal accounts also meant there was mistrust and skepticism around hiring IT specialists or outsiders because of fears of losing access and control over their digital platforms (Gomes 2023).

> I don't want to allow a third party to monitor on the page … Because someone might end up clicking on something [fraud links] out of ignorance or out of spite and we just couldn't have that, so we just decided to do it ourselves. (ME11b).

These limitations were addressed as enterprises gradually transitioned from bricolage to more conventional business solutions that allowed them to streamline transactions and operations. However, the examples given also highlight the limitations of selective digital bricolage.

4.4. Digitalization with Digital Planning

Enterprises that digitalize with digital planning pursue a structured approach to digitalization, guided by a more strategic vision and investment in digital resources and professional expertise. These enterprises

create value and grow by building on a recombination of standard or innovative paid versions of various business tools and software. These can include specialized apps, multiple social media, mobile money channels, and cloud services, with some occasional bricolage to account for resource constraints (e.g., using Word and Excel for debt tracking and invoicing).

Table 8 presents a clear contrast with the practices of digital bricolage. Digital planning often involved using the same or similar technologies as digital bricoleurs as part of a wider array of digital resources, but with an important distinction: digital planners almost always opted for the paid/business version, acknowledging that "with the digital world if you don't pay there is no way you will go far" (ME3d). In this way, digital planning enabled entrepreneurs to strategically select, integrate, and repurpose digital technologies, even relatively basic or affordable ones, to achieve coherence, scalability, and efficiency in their operations and adopt a forward-looking perspective oriented to growth:

> So, you need to have that mindset that things will get better, and the fact that you are going through something now doesn't mean it's forever; it's just for a while, just for you to learn and then you know, or even prepare you for the future. —ME39d.

Digital assemblages in this digitalization path were also more sophisticated and built from combinations of technologies that did not require compromises,

Table 8. Technology Use in Digital Planning

Technology	Use[a]	Examples	Illustrative quotes
Messaging	r, c	Linking across platforms	"So, when they go to my Instagram, there's a link that comes to my WhatsApp, and also I use my WhatsApp for my marketing, posting of videos and pictures of work stuff done previously, and through that I've been able to get a lot of people booking me for events." (ME40d)
Social media	r, c	Combining business platforms and accounts	"With my [Instagram] boosting, I do the direct link to my Direct Messenger, so it's easier for people to just message me … [and] for me to … differentiate from the ghost and the spam people." (ME33d)
			"I interact with my customers across the board on all those social media networks. So, in Twitter and Facebook, Instagram." (ME6d)
	b, r, c	Combining personal and business platforms and accounts	"Facebook and Instagram … are linked. For the part that we want to boost our posts and other things, we use Facebook a lot. And then it translates to Instagram also." (ME25d)
			"For Snap, you need … a special account, like a commercial account … with WhatsApp, we had a business account. But … we couldn't do certain things. So came back to the normal WhatsApp." (ME39d)
Business website	c	Using a business website	"When working on the website, I want to be strict on, maybe, what I want to put in the website if I'm going to put everything in one." (ME33d)
Cloud-based apps	r, c	Multiple cloud services	"We use OneDrive, Dropbox. And then, Amazon AWS, Amazon's cloud, where we have a PC." (ME25d)
Desktop apps	b, r, c	Using Word and Excel for debt tracking, timelines, and invoices	"I use spreadsheet mainly to keep records for my customers, especially my debtors, people who owe the business … " (ME28d)
			"I use them [Excel, Word] to create timelines for clients. Draw up the program line up, and also draw up invoices." (ME40d)
Online banking	r, c	Combining bank transfers with mobile money	"And if the person is only going to use bank transfer, you know, it's very difficult for them … they prefer using mobile money … but just that the charges are too much." (ME3d)
Mobile money	r, c	Multiple mobile money channels	"We're using the popular MTN MoMo and Vodafone Cash when we began. We later introduced Zeepay and AirtelTigo." (ME22d)
	b, r, c	Using personal and business mobile money	"I've not actually registered one for that. So, I just have like a personal mobile money account … go to the service centres … so … have, like, large amounts come through." (ME33d)

[a]Examples of digital bricolage (b), recombination (r), and conventional technology use (c).

instead complementing each other. Examples include combining various business accounts in social media and communication platforms with multiple mobile money services or using personal and business mobile money to avoid charges on the latter where possible. None of the enterprises used mobile money loans, either personal or business related, despite their officially registered status allowing them to do so. Occasionally, some relied on limited bricolage, combining business with personal use of apps or using Word and Excel for debt tracking and invoicing. However, these were either short-term improvisations or insignificant in terms of the overall enterprise digitalization. With this approach, digital planning enabled a more deliberate and structured approach compared with digital bricolage:

> With *my digital executive background*, I've been able to *study each [social media] site and know what I can do with those sites* … So, I try to use them according to their uptakes, and what information I know fits for those guys. —ME33d

> We have a planned digital strategy, now this is our strategy because we know that now … to do things digitally means it makes it faster and efficient … and strategically taking advantage of digital innovations to cut our production time. —ME43d

Greater diversity and intensity in technological recombination, coupled with a more strategic approach to digitalization, facilitated the greater extent of digital value connections (see Online Appendix IV) through a *broader array of technologies* and a *deeper level of technology utilization*, moving beyond the reliance on freely available digital features that characterizes digital bricolage. In this way, these enterprises addressed economic, social, and institutional limitations and promoted a more proactive outlook: "The digital journey shouldn't move in one direction, so we try to diversify" (ME28d). In one example from our fieldwork, an enterprise addressed limited internet infrastructure by employing multiple internet service providers, which allowed them to switch providers if one was unavailable or slow. To adapt to the challenges posed by COVID-19, some enterprises introduced specialized business technologies (e.g., TeamViewer and AnyDesk), including, in some cases, the development of in-house apps, although only enterprises engaged in digital planning had the capability to create their own software. This helped them better problem solve "using digital innovations to solve everyday problems" (ME43d) and be more competitive:

> So, there's this, the digital app called All Seated. And it actually helps me with the floor planning of the event … (for) a client … who was deaf. So she was, like … she needs to see the thing to understand. So, I had to create this 3D setup of how her event was going to be and it really helped me. —ME40d

These enterprises also acknowledged environmental limitations to a lesser degree than digital bricoleurs. Their decisions were also primarily driven by market demands and strategic considerations, rather than resource constraints. In comparison with the capabilities of digital bricoleurs, they actively delegated the use of digital technologies to their employees, supplementing this with informal methods, formal education, and self-taught skills. Their digitalization could therefore operate independently of them, allowing them to concentrate on innovations to advance their business objectives:

> I came out with one or two innovations that helped to push my business to the next level. —ME28d

The digitalization approach they adopted brought a range of benefits, including reduced operational costs ("the overhead costs of the company have drastically reduced" (ME6d)), the creation of new operational channels, an expanding customer base, and scaling of the enterprise within and beyond Ghana: "[We] created a small software that actually enabled us to run our business very well. I *think … I'm confident I'm a digital innovator*" (ME28d).

5. Discussion

How do microenterprises "make do" with their digitalization in resource-constrained environments? The literature has established a connection between digitalization and organizational value creation and growth. However, existing theory on digitalization processes and outcomes stems primarily from resource-rich environments and digital ventures that utilize advanced or custom-designed technology like platforms and AI to meet specific strategic needs and undertake well-defined projects (Du and Mao 2018, Li et al. 2018, Soluk and Kammerlander 2021, Weber et al. 2022, Etienne Fabian et al. 2023). This does not align with the realities faced by many smaller enterprises in developing countries, which are digitalizing with limited resources and capabilities, infrastructure gaps, and institutional voids. Within IS research, where emergent digitalization paths are considered, the focus is often on a specific technology, isolated improvisations, or a response to unexpected events (Hartl and Hess 2019, Oborn et al. 2019). For smaller enterprises in Africa, however, such flexible practices are part of dealing with "normal extraordinary" situations (Gomes 2023).

We build on the theories of entrepreneurial bricolage (Baker and Nelson 2005, Duymedjian and Rüling 2010), alternative and emergent technology use in resource-limited settings (Oborn et al. 2019, Zorina 2021), and digital value creation (Yoo et al. 2010,

Henfridsson et al. 2018) to stimulate a new theory of *digital bricolage* and its boundaries, as a critical yet hitherto undertheorized process of digitalization in resource-constrained environments. The concept of digital bricolage is an important practice for digitalization of microenterprises. For these enterprises, digital bricolage is the sine qua non of their enterprise digitalization, a process that can result in a mix of pathways. As such, our concept of digital bricolage offers an important perspective on digitalization, not as a monolithic phenomenon but as emerging from the dynamic customization of affordable digital technologies and following three distinctive pathways: parallel bricolage, selective bricolage, and digital planning. This is a different abstraction from most contemporary IS theories of digitalization. As a helpful theoretical turn, it represents the emerging trajectories of smaller, resource-constrained enterprises and closes the gap on more linear, rational, and economically focused theoretical accounts of digitalization found in the IS literature.

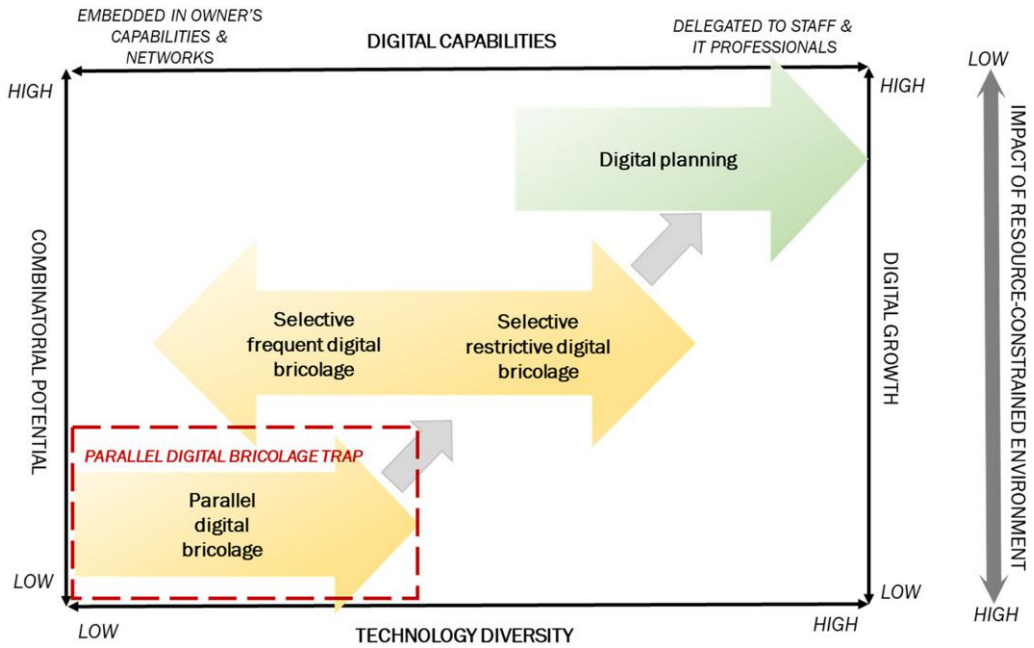
Figure 1 illustrates the three distinct digitalization pathways positioned along a configuration of technology diversity, from combinatorial potential to digital capabilities. We show that the three paths differ in their potential for the enterprise's digital advancement and digital value creation. And further, we show that the same properties that are assumed in the literature as unconditionally unlocking enterprise value and growth (Henfridsson et al. 2018, Vial 2019, Piccoli et al. 2022, Etienne Fabian et al. 2023) can enable contested impacts in resource-constrained contexts.

The path of *parallel digital bricolage* involves the pervasive use of a limited range of familiar, affordable, and repurposed digital resources, which are then recombined into a functioning digitalization. The path of *selective digital bricolage* adopts a more balanced approach, combining bricolage with standard digital tools to enable moderate growth and operational efficiency. The path of *digital planning*, by contrast, follows a more conventional, strategic approach, allowing for occasional bricolage but focused on structured infrastructure, greater integration, scalability, and value creation.

Figure 1 also illustrates how movement between the three digitalization pathways can occur when context, resources, support, and learning evolve (indicated by the gray arrows). For instance, entrepreneurs may shift from parallel to selective digital bricolage as they gain experience, adopt more diverse tools, and blend bricolage with conventional technology use, often prompted by a growing customer base. Similarly, moving toward digital planning may follow increased confidence, delegation of digital tasks, or investment in formal technologies such as websites, customer relationship management (CRM) systems, or corporate payment systems, thus marking a transition from improvisation to deliberate planning.

Parallel digital bricolage relies on personal skills and support from hangers-on (Baker and Nelson 2005), enabling enterprises to navigate immediate resource constraints, survive, potentially achieve modest growth, and possibly follow a more selective digital bricolage (i.e., the gray arrow in Figure 1). Microentrepreneurs

Figure 1. (Color online) Bricolage-Enabled Digitalization and Its Limits



following this path may be very active in their use of social media and mobile money; however, the path can still lead to a trap (see the red box in Figure 1). In the trap, the evolving network of free digital resources is assembled in such a way that compromises accumulate (Steffens et al. 2023) and recombinability is inverted; that is, the assemblage fails to fully exploit the flexibility and modular recombinations of digital technology (Lanzara 1999, Henfridsson et al. 2018, Zorina 2021). To illustrate, whereas digital bricoleurs lamented frequent fraud and scams when using personal mobile money accounts, those who did not rely on such practices benefited from fraud protection features embedded in merchant payment systems. Reliance on parallel digital bricolage also demanded the manager's limited attention to hold together the digitalization because the idiosyncratic nature of bricolage means arrangements are often inseparable from their creators (Duymedjian and Rüling 2010). In this sense, the modular recombination potential of no-/low-cost digital tools such as personal WhatsApp, Facebook, Instagram, and mobile money accounts is further underutilized by the bricoleur's limited attention span and capabilities. In other words, whereas bricolage is often associated with creative resource recombination (Baker and Nelson 2005, Halme et al. 2012), our findings show that excessive digital bricolage leads to stunting of the generative potential of digital technologies. This then leads us to the following theoretical proposition:

Proposition 1. *Parallel digital bricolage temporarily eases resource constraints and yields adequate returns but leads to an accumulation of compromises. This constrains the range of technologies that can be effectively integrated into digitalization and limits the potential for innovative recombination of digital technologies.*

Selective-frequent digital bricolage describes a digitalization path where bricolage practices are moderate rather than all-encompassing and are integrated with innovative recombination and conventional technology use. Thus, it can be used in conjunction with conventional processes to break through resource constraints (Onwuegbuzie and Mafimisebi 2021). Like parallel digital bricolage, it may be an inelegant, second-best solution, but it does its job and can also be improved upon (Lanzara 1999). Enterprises may evolve from primarily engaging in parallel digital bricolage and do so typically by moving on to the paid versions of applications and more integration (as indicated by the gray arrow in Figure 1). However, they still must ensure that their digital bricolage practices do not block a pathway to digital maturity. That is, selective-frequent digital bricolage extends the potential for modular recombination and integration yet still requires a careful balance of bricolage practices to avoid blocking progress toward digital maturity or becoming digitally stagnant. This leads us to the following proposition:

Proposition 2. *Selective-frequent digital bricolage eases immediate resource constraints and yields adequate returns. It potentially enables microenterprises to achieve higher levels of digitalization and capabilities.*

Selective-restrictive digital bricolage relies on a wider variety of technology, recombination, and conventional technology use. Enterprises apply it sparingly and in noncritical areas, if at all, while also favoring a more optimized approach to procuring and applying high-quality resources and related capabilities for specific purposes. This allows them both to expand the range of available technologies and to increase possibilities for modular recombination independently of the owner, and it doesn't overly compromise the ability to scale up digitalization. As this suggests, restricted application of digital bricolage may even be helpful in resource-scarce environments for progressive development of a resource base and organizational capabilities. This supports the entrepreneurial bricolage literature that found it was helpful for developing competitiveness and scaling in early-stage ventures (Steffens et al. 2023). This leads us to the following theoretical proposition:

Proposition 3. *Integrated with traditional methods, selective restricted digital bricolage not only eases immediate resource constraints for microenterprises but also allows them to achieve higher levels of digitalization and capabilities. This integration creates a synergistic effect that allows some harnessing of digital technology's recombinatory potential.*

5.1. Contribution to Theory

Our study advances theory on digitalization and bricolage in several ways. We extend IS theory on digitalization by showing that microenterprises in resource-constrained environments may follow a different route to digitalization: one that is less strategic, more emergent, and oriented to the situation at hand. For them, digital bricolage may be a viable path and, for some, the only path to digitalization. It allows enterprises to make do their digitalization and survive in penurious environments. This broadens the theoretical understanding of digitalization and digital value creation in resource-constrained environments by introducing the concept of digital bricolage.

As noted in our propositions, our research highlights how digitalization through digital bricolage can both enable and limit value creation. We thus offer a nuanced understanding of its complexities and potentially limiting aspects (Scott and Orlikowski 2022, Li et al. 2023). For many microenterprises, we observed a circular dynamic: resource constraints may push them to digitalization, yet the process of digitalization itself

is simultaneously enabled and restricted by digital bricolage.

Our study contributes as well to current theorizing of digital resources (Yoo et al. 2010, Henfridsson et al. 2018, Piccoli et al. 2022, Baiyere et al. 2023). This literature conceptualizes them as modular, versatile, recombinable components that promote flexibility, creativity, and an open landscape of enterprise value creation. These characteristics are assumed to unlock value and growth (Henfridsson et al. 2018, Vial 2019, Piccoli et al. 2022, Etienne Fabian et al. 2023). However, our findings challenge the assumption that digital resources inherently offer boundless combinatorial and generative capacity. In resource-constrained settings, this flexibility presents a paradox: whereas bricolage supports creative problem solving and ad hoc innovations, it can also constrain digital recombination and long-term value creation. Although modular and versatile features allow affordable technologies to meet immediate needs, their limited functionality, integration challenges, and dependence on the bricoleur's personal capabilities restrict scalability and broader value realization. As we have observed, enterprises overly reliant on digital bricolage accumulate compounding compromises (Steffens et al. 2023), hindering their ability to leverage the full potential of digital resources (Henfridsson et al. 2018, Zorina 2021). This often results in avoidance of market platforms and websites that do not align with bricolage practices.

These insights extend theories of digital generativity by foregrounding how value creation unfolds and is constrained in resource-scarce environments (Henfridsson et al. 2018, Vial 2019, Piccoli et al. 2022, Etienne Fabian et al. 2023). Importantly, we show that the digital bricolage trap is not inevitable. Alternative digitalization pathways that balance digital bricolage with more structured digitalization, such as selective bricolage, can enhance combinatorial potential and enable value creation without triggering the trap. For instance, integrating bricolage with more formal tools (e.g., transitioning to business platforms or payment systems) offers a pathway to moderate digital growth.

Our work contributes to and distinguishes itself from past studies of entrepreneurial bricolage that have largely overlooked the specific dynamic between bricolage and digital technology, even in the context of enterprise survival during the pandemic (Baier-Fuentes et al. 2023). Whereas past research has emphasized how entrepreneurs creatively combine discarded resources (Baker and Nelson 2005), the digital bricolage we observed is distinct from turning trash into treasure or salvaging physical resources (Baker and Nelson 2005). Unlike traditional bricolage, which often involves creating a new artifact from tangible scraps, the digital technologies in our study are designed to be flexible and reprogrammable (Henfridsson et al. 2018, Pentland et al. 2022), offering broader possibilities for creative recombination. Furthermore, our focus is not on growth per se, as in much entrepreneurial literature (Steffens et al. 2023), but on how digitalization itself is shaped by bricolage.

Consistent with the entrepreneurial bricolage literature, we find that enterprises respond to contingencies of the moment by making do with the resources at hand (Baker and Nelson 2005). In the context of digitalization, though, this includes relying on low-cost and free digital technologies, prioritizing minimization of IT infrastructure and physical space needs, leveraging existing digital capabilities internally or within relational networks, and repurposing existing digital technology. These practices reflect core bricolage principles of resource accumulation, combination, and experimentation. They give practical advantages to microenterprises, such as bypassing digital skill gaps and reducing reliance on external support. Free tools lower financial burdens and infrastructure costs, aligning well with broader behavioral shifts toward mobile payments and social media–based communication (World Bank 2017, Senyo et al. 2022).

Our conceptualization of digital bricolage pathways also extends earlier work on entrepreneurial and organizational bricolage (Baker and Nelson 2005, Duymedjian and Rüling 2010, Steffens et al. 2023). We show that selective bricolage can act as a transitional phase within the broader digitalization journey, particularly relevant in developing contexts where enterprises must navigate constraints without blocking their progression toward digital maturity.

We also show that contrary to dominant assumptions on digital resource value creation (Henfridsson et al. 2018, Vial 2019, Piccoli et al. 2022, Etienne Fabian et al. 2023), some forms of digital bricolage can impose restrictions on the breadth and depth of resource combination. This shows clearly how context shapes the outcomes of digital bricolage and highlights the need for greater attention to environmental factors in future research (Gomes 2023).

Finally, our work contributes to and diverges from the concept of IT bricolage (Ciborra 1996, Ciborra 2002), which has focused predominantly on created and sophisticated tinkering with IT artefacts (Lanzara 1998, Zorina 2021). Many microenterprises in resource-constrained environments lack the capability to code software or tinker with hardware. In our study, for instance, only enterprises engaged in digital planning showed the capability of creating their own software. Rather than tinkering with code or hardware, digital bricoleurs in our study (re)assembled everyday tools into ad hoc yet functional systems of digitalization. This resulted not in the building of new artifacts but, rather, in a reimagining of how available digital resources can be combined into workable and evolving solutions (da Silva et al. 2023).

5.2. Future Research Directions and Limitations

Our work offers several opportunities for further exploration and expansion. Future research could narrow down to a specific industry setting to determine more closely the patterns found within a sector. Another interesting avenue is examining whether digital and conventional entrepreneurial bricolage coexist or if they occur independently. Our research suggests that digital bricolage is now deeply embedded in enterprises to the extent that it may become indistinguishable from entrepreneurial bricolage. Future studies could also take a quantitative position, using control variables that include, for instance, the number of employees, age of business, revenue, industry, location, and digital capabilities (Etienne Fabian et al. 2023). A further practical orientation could look at how best to support microenterprises in unlocking the combinatorial potential of these technologies and mastering digital bricolage.

A limitation of our study lies in its cross-sectional nature. Longitudinal research could provide insights into the ongoing processes of digital bricolage, its limitations, or its marginal returns. Whereas our study benefits from in-depth data from one setting, this is also a limitation. The emphasis on Ghana reflects the scope of our project; however, the literature clearly shows that many enterprises in the Global South share similar characteristics and challenges. Comparative studies could be conducted to confirm our findings.

6. Conclusion

Small enterprises are shrinking rapidly under pressure to change and digitalize (Rogers 2016). In response, many have had to reimagine how they use digital technology to do business. Our study contributes to digitalization research and extends the classical theory of bricolage by introducing the concept of digital bricolage as the sine qua non, the essential element, in the digitalization path of many microenterprises operating in resource-constrained environments. Whereas digital bricolage can enable short-term survival and flexibility, it can also create a digital bricolage trap: a condition where an evolving network of digital resources and their combinations ease immediate resource constraints but lead to the accumulation of compromises, hindering digital maturity and growth. By contrasting this with the digital planning path, we call for greater attention to the diverse and evolving trajectories by which enterprises navigate continuous digital transformations amid constraints.

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